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To Alonzo Wright, Esq., M.P. &c. &c.

Sir,—

I have the honor to dedicate to you as member of Parliament for Ottawa County the annexed pamphlet, shewing the geology and mineralogy of the rich territory comprised within the said County of Ottawa. The ancient Province of Quebec has nowhere within its boundaries greater sources of wealth, than in the county to which this pamphlet refers, and if by your kind acceptance of this a dedication the attention of the Government and of the public generally is more closely drawn to the importance of the subjects herein referred to, the object which I have had in view will have been accomplished.

I have the honor to be,
Sir
Your obedient servant,

J. MURRAY MITCHELL, C.E.

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OTTAWA & GATINEAU VALLEY RAILWAY

AN OTTAWA COLONIZATION RAILWAY

Office of the Engineer-in-Chief

GENTLEMEN

I have the honor to transmit for the information and guidance of the Directorate, the accompanying reports relative to the geology mineralogy and general features of Ottawa County and the territory north to James Bay with a view to the ultimate extension of the Ottawa and Gatineau Valley Railway to that latitude.

I have the honor to be Gentlemen,
Your obedient servant,

J MURRAY MITCHELL,
Engineer-in-Chief

TO THE PRESIDENT AND DIRECTORS
O & G V and O C Railways,
Ottawa.

OTTAWA COUNTY.

Its Resources and Capabilities.

Exactly what area of country is comprehended under the above title, cannot as yet be stated. Its northern limit has not been determined by actual survey, and may, perhaps, be placed at the south west shore of St. James' Bay, or else at the southern boundary line of the Hudson's Bay Company's territory at the height of land. If we give 14,000 square miles as its contents, we shall, perhaps, be near—certainly inside of—the mark for this last supposition for the northern boundary. Although it is the county which has paid the greatest revenue to the Provincial treasury, it has, so far, received very little in return. As yet quite a large portion of it has not even been surveyed for settlement. Its natural wealth has been the cause of much of this neglect. The millions of dollars worth of lumber its forests contained has been reserved for the enriching of three or four firms, whose only care has been the barring out of settlers, who might intrude upon their timber limits, and a steady resistance to all improvements which might direct attention to their monopoly, and also enhance the value of the commodities they purchase in the district. This furnishes an answer to the query why so valuable a section of country is so thinly populated. Farmers must depend altogether upon the lumber trade. It is that which sets the value both on labour and produce. Of late years, fair roads have been constructed in some localities, and this has struck a heavy blow at the lumberers' power, for improved travelling facilities have militated greatly against the unfortunate "truck" system which is generally made the rule in backward places. Wherever it is possible for the produce to be brought to market, and for necessaries to be purchased without restrictions of truck or barter, prosperity is invariably the rule. The Townships of Lochaber Buckingham, Templeton, Hull, Hardley and West Wakefield may be cited as proofs of what I assert. There is no reason why the Townships of Egan and Kensington for instance, should not be as opulent and prosperous as any of these, had they the same advantages of travel. The soil is said to be equally good probably better and the land generally is not as rough. When the length of the journey to the best has been reduced from four days to as many hours, we may expect the natural richness of the land to declare itself. At present these more northerly townships produce for sale only hay oats and potatoes, as these products always sell in the shanties. Very little wheat is grown there although a late Reeve of the district declared that sixty bushels had been reaped for one bushel sown. There is no rotation of crops and the little farms are robbed of the material which should be returned to them in the form of manure. What wonder if the inhabitants of this end of the County are few, when the virtual rulers there are men whose interests clash so decidedly with those of the settlers. That the lack of inhabitants is

not an unmitigated evil. In order to mark the land it must first be thoroughly cleared of trees, and as pine is almost the only marketable lumber owing to the impossibility of floating the heavier hardwoods, the maple, oak, butternut, birch, beech, basswood, elm, &c., are rolled into heaps and burnt out of the way. When the railways are completed, all these woods, now so largely used for ornamental and other purposes, will be of very great value, owing to the sudden failure of the supply of black walnut. Black birch the only marketable substitute, has almost doubled in value during the past few months. Had the land been cleared before railway communication with the trade centres was established, all the birch and other hardwoods must have been burnt, and thousands of dollars lost to the country. Every Township has some of these woods, and many of them have immense tracts of birch, oak and maple of fine growth and quality. Soon nothing but the mere brush need be destroyed as the demand for fire-wood in Hull and Ottawa will provide a ready market for everything else.

We may reasonably expect also that the Gatineau Ann Lievre and smaller rivers will be found to furnish advantageous sites for mills and factories, for the turning out of wooden-ware and implements. Of late years quite an important and lucrative trade has sprung up in paper pulp. The whitest and most fibrous woods are chosen and taken to the mill in short lengths, these having been freed from knots and bark the blocks are brought into contact with rapidly-revolving emery mill stones, and by copious quantities of water are reduced to pulp. Sometimes the wood is reduced to pulp by a more complicated process necessitating a very high pressure of steam, but the former is the more common and probably cheaper system. With these articles Ottawa County could furnish the whole paper trade for years to come. The woods at present looked upon as most useless, such as white birch, poplars and soft maple, are just what the business requires, and will doubtless be seen to have a real value, when the attention of manufacturers has been attracted to this fact. On the line of the Quebec Central Railway the extension of the S. E. T. & K. R.R. a good trade is done in short logs of spruce and balsam, which are manufactured into packing cases for the English market. There is no reason why the Gatineau Ann and branches should not bring them made of feet of such material to the factories—at the present time there is an actual demand in Ottawa for an unlimited number of shingles for shipment to the United States. Cedar shingles sell for $3.75 per M. for $3.00 per thousand. This price offers so fair a profit, that a gentleman of my acquaintance is actually fitting up a small steam mill for the manufacture of shingles during the winter and expects to make money by it, though the shingles will be made will be carted to Ottawa, a distance of over 80 miles. What then would his profits be, were the projected railway once stocked. And why not the out such mills could be kept in operation in the County so far as the raw material is concerned. There is no reason why hemlock bark, which sells from four to eight dollars per cord, and oak bark, much more valuable to the tanner should not be sent out of the County so soon as means of carriage have been provided. Taking these and other similar facts into consideration I feel sure that the woods of the country are yet to yield such profits as will agreeably surprise those who fancy the bush worse than valueless, after the pine and fencing cedar has been taken away

As at present situated, however, we can scarcely wonder at the antagonism shown by the farmers to the trees. He knows that just where the bush is thickest, and the wood largest, he will find his best land. So with no market near, no means of conveying the timber to town, what wonder if he chops the trees, rolls the logs into heaps, and destroys them by fire. Invariably the first year's crop reimburses him for his trouble. The writer has seen oat and wheat straw seven feet high on new land, though the seed was only scratched into the ground with a heavy harrow. Indeed the crops thrown off by the farms in this country are, as a rule, wonderfully good. That the soil is rich, generally speaking, is proved theoretically by the presence in great quantity of crystalline limestone; practically by the luxurious growth of the timber; *En passant*, I might mention the fact that the huge pine board exhibited at the Great Exhibition, England, was cut from a tree found upon a well-known "lumt" in this County. True, a good third of Ottawa County is taken up by rocky mountains, which present a decidedly rough appearance to the dwellers in prairie-land districts. But the general excellence of the remaining two-thirds fully compensates for this rough portion; where cleared and farmed, the crops are nearly always good. For instance, one farmer had 60 cwts. of flour (300 lbs.) from 6½ bushels of spring wheat; another had 80 bushels, from 2 bushels sown, and I could multiply instances indefinitely. Oats yield on an average 30 to 50 bushels to the acre; rye 25 to 35 bushels—root crops are always most successful. The arable land varies from light loam to heavy clay, from warm sandy to black muck. And there the hills are of very great service to the farmer. As soon as the snow leaves them in the spring, they are covered with sweet succulent grass, than which nothing could be better for cattle and sheep. In fact for stock-rearing the district could scarcely be excelled. The quality of the mutton about equals that of the Welsh mountains, and if South Downs were introduced could be improved as to size, and so well fitted for the English market. At present prices are absurdly low—so low indeed that farmers, as a rule, keep only enough sheep to furnish them houses with flannels and wool, and sell the lambs at the end of the season. This year lambs sold at that time brought from $1 to $2.50 each (*i.e.* from 8*s.* 4*d.* to 9*s.* 8*d.* each). But then the buyers had to drive the flock from 50 to 90 miles to the nearest railway station. For sheep there is no sale at all. For beef the manager of one of the great lumber firms is offering this autumn $3 per cwt., though even in Ottawa it at present sells at from 4½ cents to 6 cents per pound live weight—already some of the more wide-awake farmers are preparing to participate in the cattle export trade. Stock is being improved, wintering capacity increased, and lands enlarged. It is felt that a share in this, the best paying of all the export trades, of right belongs to the County; though the lack of steam communication with the sea ports has heretofore prevented farmers from taking part in it. There are now some of the finest Durhams the world has produced on the larger farms along the Gatineau River, and the grades obtained by the union of these and the hardy well-bred cows of the country will satisfy even the fastid ous taste of the English butcher. In short, as soon as the road to a fine market is opened, there can be no doubt but that the inherent capabilities of the soil will be brought out, much to the advantage of the farmer and the prosperity of the country.

But if all this were not the case, there would still be most power-

ful reasons for considering this the most valuable county in the Province. The minerals its rocks contain will certainly give it a foremost position, even in the country—boasting the mines of St. Joseph, Renous, Capelton, Thetford and Orford. Geologically speaking the rocks of the country consist of "alternations of gneiss, crystalline limestone and pyroxene strata" interstratified with several species of quartz, felspar, &c. They contain many minerals of economic value, especially the following:- Ilmenite magnetic and titanic iron, galena, apatite, plumbago, molybdenum, mica and asbestos. Many of these rocks plainly show their igneous origin, and have been subjected to much attrition. Gravel beds of considerable magnitude, and plains of coarse and fine sand complete the evidence for the glacial program, which has grouped down the once far loftier Laurentides to their present altitude. There are not wanting evidences also (*Vide* peculiar boulders mentioned in following report) of the presence of icebergs—ophicalcite, contortions, and fractures of the rocks are borne witness to, as every slide, by twisted, overlapping and upright strata. Although, therefore, an interesting district to the geologist, it is the more laborious to the prospector on account of its irregularities. He must expect that the valuable mineral veins will partake of the character of the bearing rock—that is to say, that a vein which crops out strongly in one place, will be buried under strata of indefinite thickness in another; that a leading vein will end abruptly, where the layers of rock assume a vertical position, &c., and therefore I cannot but conclude that to pass a verdict upon the wealth of the County, limiting it to the mere surface indications, is to do it an injustice. Perhaps it is equally rash to argue from the seen to the unseen but we may certainly hold that a plain fault does not of necessity imply the absolute loss, to mention logics by speaking, of the vein. Then the result of all explorations must be taken merely as comprehending the *displayed* wealth of the rocks. The remainder will not be manifest until leads have been laboriously followed, "faults" in veins looked up, and what Colorado miners term a "pay rock" discovered in every instance; and then the numerous detached beds or pockets which exist (as I believe) will require to be carefully looked after by stratographical experts, who must also be experienced mineral hunters.

At the present time the most important mining industry in the County is that of apatite. Although dating back only some 6 or 7 years here, it has already increased into enormous proportions, and is now steadily on the increase. Nor can this be wondered at when the wonderful productiveness of Ca and an apatite is taken into consideration. A sample taken almost at random from a heap on the wharf landing—of the High Rock Mine, Portland, gave on analysis, 92·752% tribasic phosphate. The product of another mine in Buckingham gave 91·060% phosphates used, equal to 89·682% tribasic phosphate of lime. According to the official report of the Analyst to the Government Geological Survey this is about the average yield of the apatite in the country. I give, in a note, a full report of the analyses in two cases, taken from the Report of the Geological Survey for 1877-78. For comparison's sake I may state that the well known mine of white (?) apatite, at Estremadura Spain, yielded but 79·091% tribasic phosphate; that of Suffolk Germany, but 79·270%, and the specimens analyzed were, I understand, selected with more care. So much for the quality of the apatite. As far as quantity is concerned,

the annexed report speaks for itself, of the surface indications of the Townships examined. Information has been received respecting lands to the north of Bigelow, which leads me to state that those who held that the apatite gradually decreased in volume northwards, were most probably not altogether in the right. For instance, in North Blake a vein has been discovered running about N.E. and S.W., which affords excellent exhibits of phosphate. It is there associated with pyroxene and small quantities of dark mica, the enveloping rock being [illegible] coloured gneiss, and occasionally flesh coloured calc spar. At the north end of the Pemichangan Lake an upright rock of tilted strata displays a beautiful vein of the vitreous dark-green apatite. I have seen a specimen obtained 60 miles above the Desert Village, on the Gatineau, crystalline and evidently extracted from a deposit of some extent. From lumbermen who have travelled miles beyond the prospectors' northern limit, I have heard of nameless rock bound lakes, whose sides exhibit green apatite in veins of varying width. At the lower end of the County discoveries are constantly being made, though only a few very large deposits have been found.

As regards the demand for phosphate, that, I am assured, is unbounded. The multiplicity of uses to which it is now applied promises a ready and *pro rata* increasing market for all that can be found. Its richness places it nearly at the head of the price list, and [illegible] the poorer grades, as e.g. the Spanish, must drop out. From the ease with which the Canadian is mined it should brook no competition; and when the projected railways are finished it will be possible to place it on the London wharves for little, if anything, over $1.50 or $2 per ton. But at present the lack of direct rail communication with deep water navigation presents an almost insurmountable barrier to the development of the phosphate industry. The trouble and expense of hauling such heavy material over country roads, in a rocky mountainous section, effectually prevents the mining of far away deposits. The same may be said of the iron ore, of which assays show an unusually high percentage of metal. This, of course, cannot be mined to advantage until the fuel is brought to the mouth of the mine by some cheap transport service. At present one of the many deposits of magnetic ore is being worked, and the crude ore shipped out of the country. This is a loss all round. The ore, the iron, refuse [illegible] is freighted to the fuel. And then, too, the industry which should be providing labour for our own people, is all to the benefit of [illegible]. As the report by Mr. E. T. Chambers shows, the country is very rich in iron ore. The assays conducted at the Templeton and Hull mines, have [illegible] established the value of the ore—[illegible] with regard to galena. An enterprising prospector discovered a promising deposit of galena, to the north of the Township of Blake. [illegible] he "stripped the show" and sank a small pit. [illegible] [illegible] of the [illegible] but could go no further. The land just around is Government [illegible] surveyed [illegible] there are no roads near the [illegible] of the [illegible] required a large [illegible] and [illegible] Company [illegible] such a remote and secluded district, it has [illegible]. On the 5th Range of Wright, an exhibit of promising galena has been discovered, and will doubtless receive the attention it deserves, as soon as the Gatineau main line has been constructed. On the 1st Range of Aylwin, near the river, a peculiar hard galena

has been found. Of less valuable minerals, the Blue Sea district in Bouchette, affords a considerable deposit of pyrites in mass. This should be thoroughly tested, as it is impossible to say of what value it may not be. The quantity is sufficiently large, I understand, to allow of its being worked to advantage for cobalt, if the percentage it contains of it is anything above a decimal.

A gentleman on the Upper Gatineau, who possesses magnificent beds of fine close-grained limestone in Northfield Township, was offered $2.25 per foot for many tons of the marble delivered in Ottawa, but could not accept the offer, owing to the length and difficulties of the road. I sent specimens of a deposit of coarser marble to a leading stone-worker in Montreal and was assured by him, that a well-stocked quarry of such material was a very valuable property. The quantity at that place is unbounded; a "stratigraphical" geologist deemed it to be an outcrop of the marble belt which turns up at Arnprior, and the [illegible] of such colour there. From a neighbouring Township I was shown specimens of a green-veined and mottled marble which ought to command a very high price in a fair market.

Amongst the resources of the County we must certainly give a place to the various colouring earths found within it. Beyond a doubt, these are of very great value, and will very soon prove an important source of revenue to the Province. Last year a United States [illegible] company was prosecuting enquiries in this very direction with a view to the purchase of some of these deposits. The [illegible] of the earths varies from very light gamboge ochre [illegible] Indian red permanent stain. Nearly all the intermediate [illegible] yellow, brown and red have been found, and generally [illegible] Range C of Derham [illegible] a fair coloured ochre; [illegible] XIth, of Low, dark red matter, the Blue Sea country [illegible] or alder; the XIII (?) of Aylwin a very dark red [illegible] probably many such beds exist which have not yet been brought to light. I have seen several houses which have been painted [illegible] with colours obtained from the land, merely mixed with raw oil.

Of graphite or plumbago, I must not allow myself to say very much, as this sketch has already run on to greater length than was intended. The Townships of Lochaber and [illegible] contain mines which have been worked successfully [illegible] there as on the part of employees, in some cases, incompetency on the part of a manager in another and too great speculation in other instances, have caused all work, I believe, to be suspended at the present time. Experts and members of the Geological Survey all agree that the quality of the plumbago is excellent, and the quantity unlimited. The second and third ranges of Hincks are also well furnished with this material. Of course for a substance in such common and general use there is always a good demand.

And now to conclude, I think that although I have only glanced at the resources of the County enough has been written to show that the building of [illegible] lines of railway [illegible] will be of the utmost importance not only to the people of the district but also to the Province at large. It means the opening up of what is [illegible] a new country and also an outpouring of minerals, which must result in a largely increased revenue, an augmented population, and the prosperity of its deserving inhabitants. Thousands of dollars, annually lost to the Province will be saved. Government property will be more

thus doubled in value, and emigration, and above all colonization will be encouraged. After all, it is that, that this Province requires something to encourage its own sturdy manly sons, to remain at home, and as soon as they find, that it is possible to do well in their native district, that they can readily obtain the real cash market price for every thing they can raise or grow; that the very bare rocks, open to their tombs and disclose mines of wealth, that their labour into a high money value, the allurements of a neighbouring Republic, and the visionary hopes a prospect of the Great Lone Land, will alike fail to charm them away. It has been so often demonstrated that it is now accepted as an axiom, that the railway is the greatest "civiliser," the greatest "colonizer" the world has yet seen, and the railway, perhaps, never had a nobler object to perform, a more important office to fill, than now lies before it in Ottawa County.

NOTE

Analysis of specimen of apatite from the twelfth range of the Township of Buckingham:

Phosphoric Acid	41·069
Fluorine	3·474
Chlorine	[illegible]
Carbonic Acid	·370
Lime	49·161
Calcium	3·903
Magnesia	·158
Alumina	·700
Sesquioxide of Iron	·195
Alkalies	[illegible]
Insoluble residue	·370
	99·506

1 — 89·652 Tribasic Phosphate of Lime.
2 — 7·131 Fluoride of Calcium.
3 — 0·406 Chloride of Calcium.
4 — 0·840 Carbonate of Lime.

Specimen from [illegible] range of Portland [illegible] measured twenty feet across:

Phosphoric Acid	41·138
Fluorine	3·908
Chlorine	[illegible]
Carbonic Acid	·238
Lime	[illegible]
Calcium	4·[illegible]
Magnesia	·16[illegible]
Alumina	·504
Sesquioxide of Iron	·094
Alkalies	[illegible]
Insoluble residue	·060
	99·884

1 — 89·[illegible] Tribasic Phosphate of Lime.
2 — 7·92[illegible] Fluoride of Calcium.
3 — 0·3[illegible] Chloride of Calcium.
4 — 0·507 Carbonate of Lime.

THE GATINEAU VALLEY

(Route of the Ottawa and Gatineau Valley Railway)

ITS GEOGRAPHICAL & TOPOGRAPHICAL FEATURES, ETC.

The Gatineau Valley may be said to comprise the whole of the district from the range of hills eight miles east of the Ottawa River to the eastern boundary of the Lièvre River, a distance of, say some 100 or 150 miles, the northern boundary being placed at the watershed of the rivers, running in a southerly direction, about 150 miles from where the Gatineau empties itself into the Ottawa River. The country partakes of all the features peculiar to the Laurentide district. Five ranges of abrupt rocky hills rise one above another, their direction being generally east and west. As a rule, however, these ranges are very much broken, especially near the river front. Tracts of plain country, generally some miles in extent, are to be found in every direction, while in the spaces formed by the dips of the hills are clear lakes, teeming with fish, and varying in size from the magnificent pond to the expanse of water 40 miles long by 30 broad. The hills are mostly covered with a most succulent grass, which provides the finest possible grazing for sheep and cattle. The soil of the table lands and plains varies from a light sandy to a rich loam; from stiff clay to dark or black muck. Oats, barley, rye and maize may be grown to advantage everywhere, while in the heavier soil wheat will always yield an abundant crop. As yet, however, the capabilities of the soil have not been thoroughly tested, lumbering operations having heretofore occupied the whole attention of the settlers. Now however the timber of the country has been so almost denuded of pine the farmers are rapidly clearing the land and the results, generally speaking, may far exceed their expectations. The great drawback with the most of them is the distance from a market, rendering it almost impossible for them to dispose of their produce and stock.

The rocks consist of a series of metamorphic sedimentary strata and are the oldest known to geology. They are altered to a highly crystalline condition and are composed of feldspathic rocks interspersed with important masses of limestone and quartzite. They contain a large number of useful and interesting minerals, including galena, zinc, apatite (phosphate of lime) plumbago, iron, asbestos, hornblende, garnet, serpentine, tourmaline, [illegible] molybdenum, marbles, etc. and also immense masses of iron ore, sometimes magnetic but more often titanic. The only remains of animal life known to exist in this series is the Eozoon, though it is believed the large quantities of carbon found in the form of graphite also point to either animal or vegetable origin.

The townships which will at once be benefitted by the projected railway are the following:—Aumond, Sicotte, Maniwaki, Kensington, Egan, Lytton, Blake, Bouchette, Cameron, Wright, Northfield, Aylwin, Hincks, Low, Denholm, Masham, Wakefield and Hull. Of

the most northerly of these, very little is known. Pine of excellent quality is found there in great abundance, so that these four townships remain as yet in the hands of the lumbermen. Hard wood, such as maple, oak, birch and beech, attains a large size there, but is at present of no value, owing to the difficulties of transportation. The size and quality of the timber gives unmistakable proof of the richness of the soil beneath, and as the land is on the whole very fine, it will become of great value as soon as farmers settle upon it. At present the total number of the inhabitants of these townships does not exceed 300. Excellent specimens of phosphate of lime have been found there, and it is probable that large deposits of this mineral will be discovered when the verdure which at present hides the rocks is removed by the settlers. Good veins of merchantable asbestus have been reported but did not come under my notice.

Following a southerly direction the next township reached is

MANIWAKI.

This township is destined to be one of the most important, from an agricultural point of view, in the whole Outaouais district. It has an acreage of 48,000 acres, of which 35,000 acres is tillable land of the greatest value, the soil being generally a rich black loam. Of the remaining 10,000 acres 8,000 would form excellent pastures for sheep. The land is level, or gently rolling as a rule, though somewhat broken to the south by stray ridges. Scarcely a fourth part of the township has been cleared as yet, a considerable portion of it having been reserved by the Government as an Indian reserve. The uncleared portion is thickly covered with timber [illegible] cedar oak and birch. Owing to the impossibility of conveying the lumber [illegible] more valuable kinds to a market by water lumbermen have heretofore contented themselves with the best specimens of [illegible] cedar only. The hardwood yet remains, therefore, and will doubtless make [illegible] for the lumber merchant as soon as he is furnished with the means of removing it.

THE VILLAGE OF DESERT

[illegible] a place of some importance, and in the present term[illegible] of [illegible] probably soon swell into a town of considerable proportions. [illegible] the confluence of the River Desert and the [illegible] [illegible] trading post for the Indians and the [illegible] of [illegible]. It already has streets properly laid out, hotels, stores, [illegible] a great church capable of seating 2,000 people, a convent, [illegible] garden attached to the [illegible] the Rev. [illegible] Provost [illegible] of the order of Christian Brothers, has succeeded in [illegible] plants in such abundance as to enable him to [illegible] [illegible] seeds. The sorghum sugar cane has also been [illegible] grown here to advantage. The Rev. Superior is a true lover [illegible] and has devoted his labours to the development of [illegible] [illegible], and allowed the members of the survey every possible [illegible], recognizing fully the greater importance to the district of the work in which they were engaged. The last census gives the number [illegible] in the township as [illegible] including settled Indians. Geologically speaking not much is officially known of Maniwaki. The rock is [illegible] chiefly porphyritic, granite or primary limestone. A white

crystalline limestone—considered an almost infallible sign of the best agricultural land—was found in close proximity to small beds of apatite. Upon the third range near Messrs. Hamilton's farm, a good promising exhibit of argentiferous galena was noticed in a boulder fragment. The percentage of silver would, I feel certain, enable the ore to be worked to good advantage, provided a sufficiently large vein were discovered. Upon the second range iron sand has been found, the percentage of iron being very high. Hematite iron ore abounds in this and adjoining townships. Of

[illegible]

three of the townships on the east side of the Gatineau, I know very little, the rapid progress of the survey leaving a visit to them quite out of the question. From specimens procured for me by kind friends, I should say that Cameron and [illegible] will well repay the attention of mineralogists. An ore obtained from Thirty-one Mile Lake contains copper with a percentage of silver almost if not quite equal to the surface indication of the world-famed Mount Bross mine of Colorado. Magnetic iron ore of the same quality as that worked to such advantage at Templeton is found there, and I have also seen good specimens of apatite brought from the same district. I am afraid I must discredit here the many stories current amongst the country people regarding the discoveries of gold in these districts. If found at all it will probably be in very small quantities, too small in fact to pay mining expenses [illegible] a phosphate of lime. The specimens I have seen tend to prove this statement, the quality being excellent and the quantity I am assured unbounded. Galena of a very soft nature has been found there and would probably yield a good return if mined for lead only. Plumbago I found there in wonderfully large quantities, and as soon as a separating process has been perfected will repay the cost of mining.

[illegible]

and Denholm, on the same east side of the river, are also rich in mineral. The former, which lies between Cameron and Hincks, has a population of 400, and is assessed for municipal purposes at $25,000. The great phosphate belt known to pass northward keeping the east side of the river from Templeton and Portland up, crops out in the most promising manner in Northfield. The surface indications in some places are surpassed though not at once evident to the superficial observer. A [illegible] of a [illegible] texture has lately been discovered there which will probably yield a marble suitable for statuary and will certainly command a high price when brought to market. A most valuable iron ore exists in large quantities. The same remarks will apply exactly to

[illegible]

the township to the south of Hincks. Plumbago and marble both promise well there. An ochre of good quality is found in a very large bed in Denholm, and now that coloring earths are rising in value bid fair to become valuable property. Both townships contain [illegible] farming lands, though Northfield seems to [illegible] respect. We may perhaps give 25,000 acres as the extent of [illegible] and in Northfield and 12,000 or 15,000 of that in Denholm [illegible]

speaking both townships are hilly, Denholm especially so, the tillable land being found generally in the valleys. Both are well watered by lakes and streams and offer good inducements to the sportsman.

Returning to the west side of the river we have first to deal with

BOUCHETTE,

the township to the south of Maniwaki. It has an acreage of 48,000, of which perhaps 25,000 is arable land. To the north the land is very light and sandy, but improves as one proceeds southward. There is a great deal of quite level land, which would produce excellent crops, and to the south excepts also. The hills are in some cases quite bare, having been denuded of soil by successive fires. We found many interesting pockets of phosphate of lime, containing perhaps from 50 to 7[illegible] tons of mineral apiece, and also whole mountains of iron ore. [illegible]pidas, I noticed, [illegible] in some spots—perhaps in paying quantities on the N[illegible] farm. There is a good deal of birch in Bouchette and as this is now one of the most valuable woods it will be rapidly disposed of as soon as the Gatineau Valley Railway has become a [illegible]. The population is, say 450, the assessment being at present $[illegible].

WRIGHT

is at present a most important township. It has an area of 48,000 acres, [illegible] of it is good arable land. The soil is a loam with occasional [illegible] of clay. Several large farms have, by the use of modern machinery, been brought into an excellent state of cultivation and will repay the care bestowed upon them. Wheat of a sample difficult [illegible] [illegible] grown here, while roots attain the largest size. The [illegible] is [illegible] consisting principally of farmers of the [illegible]. The village of Victoria has already been properly laid [illegible] Roman Catholic Church, Court House, agricultural ex[illegible] buildings. Its inhabitants number upwards of 200. The Blue Sea Lake, to the west of the township, is rich in minerals. Colouring earths of various shades are found here in quantities. On lots 6, 7 and 8 of the [illegible] range specimens of the most valuable phosphate have been found. Considerable deposits of the same substance were noticed in other parts of the same township. Copper has also been discovered in small quantities.

Along the banks of the Picanock River are valuable tracts of timber land, oak and ash being found there to the finest size and value. The assessment for municipal purposes, is $66,000.

AYLWIN

in its general features closely resembles Bouchette, so that I need not repeat myself here, but refer you to what was said of that township. I [illegible] saw some fine farms of large extent, all of which invariably yield [illegible] yearly returns. The population is, say 200. Aylwin has been [illegible] as the principal lumbering district, and now possesses but little merchantable lumber, which fires having from time to time swept almost the whole township. Its minerals as far as I can complete a fair enumeration, are oxide of iron, graphite, garnet and talc.

LOW

may be set down as an extensive township. It has a total area of 64,000 acres, of which little more than half is arable land. The soil

alternates between sand and blue clay. The crops raised are nevertheless fair though the land cannot for long remain of any use under the rude system employed by the majority of the farmers. It has a large population, as compared with the other townships, but I am unable to give the figures. The hills are abrupt and rocky, though very little rock is found in the flat districts. To the south the country is very much broken by deep precipitous gulleys. The rock is principally protogine of an approximating nature. Some small pockets of phosphate were noticed at the north end of the township. Narrow veins of asbestos were also discovered. Colouring cattle of most pronounced colors were found on the 11th range. Its present assessment is $66,000.

MASHAM

is the farmers' township, the percentage of arable land being probably higher than that of any of the surrounding townships. The soil is principally a heavy loam, which raises the finest cereal and root crops. It has not much rock and very little valuable mineral at the front. To the west iron abounds, and small deposits of phosphate have been discovered. Gold in small quantities has been, noticed by members of the geological survey. The township is well settled by a most energetic lot of well-to-do farmers. Of

WAKEFIELD AND HULL

it is quite unnecessary for me to say much. Both townships have for many years been well cleared and found to contain excellent farming lands. Geologically they are well known, having been thoroughly reported by well known experts. [illegible] of phosphate are found there, and a number of mines are at present in operation. I must not close this report without reference to the class of horned cattle the country contains. The influence of the large depot farms has been felt in this direction. The presence of thoroughbred animals of the Durham and Ayrshire breeds having had a most beneficial effect upon all the cattle, consequently there is to be found there just the kind of stock the export trade requires. The broad deep, [illegible]-eyed [illegible] [illegible] take the eye of the British [illegible]. Taking this fact in connection with the grazing facilities of the whole valley we [illegible] doubt but that in a short time a most lucrative trade will spring up provided the means of rapid and direct transportation are at hand.

The farms of Andrew Wright, Esq., M.P., Hamilton Bros., Ross Bros., Hal [illegible] & Co., [illegible], Lake [illegible] Aylwin and others, for extent, fertility and general condition, are equal to any on the continent. The root and other crops in most years have been superior and have always been equal to those raised on the best lands in other portions of the Dominion of Canada.

As might have been expected from the nature of the country, the Gatineau River and most of the streams running into it offer many most advantageous sites for mills and factories. As the [illegible] of timber shoots upon the main river and its larger tributaries testify, we need go back but a very short distance to find natural falls, with a head of water capable of furnishing motive power to mills of the largest size.

THE AUX LIEVRES VALLEY

(Route of the Ottawa Colonization Railway.)

GENERAL NOTES FROM LATE REPORTS OF THE CHIEF ENGINEER.

Rich as the Gatineau Valley, on the west side of the river undoubtedly is, there can be but little doubt of the superiority of the east side, from a mineralogical point of view. Of course, as before stated, the west side has not received the same general attention as has been given to the district between the Gatineau and Aux Lievres Rivers. Valuable deposits of apatite, galena, copper, iron and kaolin have been discovered in certain localities along the route of the Gatineau Valley Railway line some of them quite recently. But on the east side, the section traversed by the survey of the Ottawa Colonization Railway has long been known to be *par excellence* the phosphate region of the American continent.

To show this more clearly, I refer you to the map of the County of Ottawa. If from a point to the north of Cameron township, a line be drawn in a direction due east to the limit of McGill, and from this point a southerly right line be extended to the county limit of Buckingham, the rectangle completed by the Gatineau and Ottawa Rivers, the rectangle will be found to contain some 600,000 acres. Then I am under the mark than otherwise when I assert that 250,000 acres of the enclosed district has been found, upon actual exploration and examination, to contain phosphate in large, well paying quantities.

In other words the one great belt of this mineral which may be traced from the point of convergence near the gore of Templeton northwards to the extreme limits of the Laurentian area, cover nearly one-half of the circumscribed portion of Ottawa County.

This does not include all the [illegible] of the district. Crystalline deposits, varying in quantity from a few glistening crystals to the "pocket" containing thousands of tons, have been actually found in, with few exceptions, every portion of every township not actually running in either of the great bands. The trade in this mineral is in its infancy, although at present the activity witnessed at the various mines in working is very great.

As a fertilizer it has to seek a market in older countries, hence shipments are now made to England, France, Germany and the United States, and the ultimate result of largely increased demand cannot be considered doubtful. Already English and French farmers, induced by the great superiority of phosphate to the so [illegible] termed guano, [illegible] has arrived at beyond the experimental point, and the demand appears to be even now very much greater than the supply.

As an illustration of personal experience I may state that in my position as Chief of the Scientific Commission in Mexico, I was induced to study the action of phosphates on tobacco lands. I can demonstrate to those interested in agricultural pursuits that apatite is of

indicate more value as a fertilizer, cheaper, and its effects more permanent or lasting.

In Ottawa County some companies are vigorously at work at the south end of the County viz., in Templeton, Buckingham and Portland, and the richest and most important in working are known as,—the "Bonanza," in East Portland, the property of W. A. Allan, Esq.; the "High Rock," owned by Messrs. Pickford, McIntosh & Co., and the "Emerald," owned by Messrs. Murray and Allan. In connexion with the development of the phosphate mining of this County the party have received much valuable information from Mr. W. A. Allan (now residing in Ottawa), who may be said to be the pioneer in phosphates in this country, and is probably more conversant with the various townships and their resources than any other gentleman, inasmuch as he has, for a period of eight years, employed his own experts in prospecting for minerals; hence his experience and information is regarded of first importance, and of greatest value.

In spite of the drawback of being compelled to haul the mineral over several miles of country roads, and under every conceivable drawback, this industry gave employment last winter to thousands of men, and fully three hundred teams, and probably yielded its promoters rich returns.

Upon the opening of navigation, a steamer, for the purpose of towing barges on the Aux Lièvres, was very successfully run by the proprietors of the "High Rock" Mines, and some 20,000 to 25,000 tons mined and shipped during the season.

South-east of the County, that is, in the townships of Lochaber, Mulgrave, Derry and Buckingham, are immense deposits of plumbago. The material is of superior quality, as is generally known. Some specimens obtained have been favorably compared with the products of the well known mines in Cumberland, England. Others of a softer less friable texture promise to be even more valuable from a commercial standpoint.

On the 4th and 5th Ranges of Buckingham and the 6th and 7th of Lochaber the plumbago hardens—if I may be allowed the expression—into a galena, certainly cogent forms in many cases.

Near the famous "High Rock" Mine alluded to, some of the finest jasper perhaps, ever brought to light in any country was observed. Jasper also abounds in Denholm, which likewise contains some heavy veins of phosphate, and both Wakefield and Denholm are rich in asbestos, of a fibre in one case longer than any of the [illegible]. The Lord Mine, which came from the [illegible] vein on [illegible] is now being worked to much good purpose in the eastern townships. Both contain beds of marketable ochres and other colouring earths. Kaolin of the finest kind was observed in several townships fronting on the Gatineau.

Of McGill, Bigelow and Bowman I here say little, as these townships are now being explored and attention will be drawn to them in other reports. Suffice it here to say that these, with Denholm, are the "locale" of the [illegible] and richest belts of phosphate. This, with their forests of most valuable woods, gives them prominence, perhaps, over all other townships in importance and value.

Ranges of white crystalline limestone rocks traverse the whole district from north to south, and in many instances will yield marbles of the finest texture and most brilliant shades, varying in colour from a decided red to a bright salmon colour, and from lilac to dark green

The nature of the rock is, of course, the best possible guarantee for the great value of the soil, from an agricultural point of view. The magnificent stretches of hardwood furnish another proof of the well founded theory.

Galena as payable quantity has been found in the townships further north and copper pyrites in various localities.

Probably of the 800,000 acres roughly estimated as it is in portions of the rectangle alluded to, 350,000 acres is arable land—this added to the areas before mentioned in the report by the Rev. W. Percy Chambers, M.A., upon the Gatineau Valley.

REPORT

ON

APATITE-BEARING ROCKS

[illegible]

MR WILLIAM STUART

In Ottawa County, Quebec

COMPILED AND ARRANGED BY

A. H. McDOUGALL, B.A. [illegible]

To C. H. MACKINTOSH, M.P., *President O. & G. V. Ry.*

SIR,—

In conformity with [illegible], prospecting has been carried on steadily during the months of October, November and part of December. In carrying on work of this kind in a thinly-settled country and especially [illegible] the autumn, many delays and difficulties were to be expected, but we have been [illegible] well aided both by the open weather and by very many residents of the County, who one and all appear to consider the interests of the Company identical with their own. In particular we are indebted to the intelligence and perseverance of our guide, Mr. Charles Bigelow, an old and respected resident of Buckingham Township, and well acquainted with the geography of [illegible] region.

We have endeavoured to arrange the field notes taken [illegible] order by keeping those belonging to the different townships separate, and by giving the descriptions of the [illegible] in [illegible] order from south to north. When [illegible] different [illegible] are seen to [illegible] connection [illegible] mentioned [illegible].

TOWNSHIP OF BOWMAN

RANGE VII.—[illegible] lots 2 and 3 there are some well-defined shows of green [illegible] crystalline apatite. The [illegible] run due north, on [illegible] the width of the vein of pure apatite is three [illegible] most—[illegible] found showing up in four places. The gangue-rock [illegible] felspathic [illegible] little quartzose [illegible], and [illegible].

[illegible] crossing lots 4, 5 and 6 apatite is seen to crop out [illegible] and [illegible] lot 7 is reached, where there are two well-defined shows, the gangue-rock being [illegible] with [illegible] lot 8, orthoclase and pyroxene still continuing.

apatite was struck in eight places, in one place there being a well defined lead running south. Here there are two small lakes on top of the mountains, all around which apatite can be found.

There is a belt of apatite-bearing rocks running across the west ends of the lots from lot 9 to lot 18. About lot 13, and extending for a distance of about two lots is a heavy belt of crystalline limestone, underlying feldspathic gneiss; small pieces of apatite were found together with bands of pyroxene and mica through the rocks. The rocks on the east ends of these lots (9 to 15) are all apparently apatite-bearing, and that mineral was found there in five or six places.

Near the centre of lots 18 and 19, there is what is known as the McKenzie Mine. This was very closely examined. On a belt of rock bearing north-east from the mine for one-fourth of a mile and some fifty or sixty feet high, the mineral apatite shows right up to the top in two distinct places very strong, and in a well-defined shape, the veins appearing to bear north-east, and dipping at an angle of about 80°. There have been some tons of phosphate taken from this place, but the mine has been left in very poor shape. The gage rock is feldspathic gneiss, with some pyroxene, mica, and very pure calc spar. The apatite is a rich green, say from 85 to 88 per cent, highly crystalline, but as depth is attained becoming more granular. These lots are apparently of very great value, and should not be disposed of in their present shape, because the "show" could, at small expense, be opened out [illegible].

A mountain about two hundred feet high runs north-west on the west ends of lots 20 21 and 22. Apatite shows on this mountain in two distinct places, beginning at about fifty feet from the bottom and extending right to the top. The apatite is highly crystalline, with rather lightly-colored pyroxene and [illegible] gage-rock is very close-grained feldspathic gneiss. Some one has been here and fired some shots, but they have not worked in the best place. Half of these lots is fine land, bearing good timber.

Following north along west ends of lots as far as lot 39, there is good land, level enough for farming purposes, and bearing fine timber.

Apatite was found on lot 34, near the edge of White Fish Lake, and if this lot were prospected more closely the mineral would probably be found in larger quantities. From lot 30 to lot 38 the rocks appear to be very rich in apatite, but no close inspection of these lots was made.

Range VI.—On lot 4 there is a well-defined show. On lot [illegible] said to be owned by Mr. Robertson, of Ottawa, there are two good shows. On west end of lot 6 there is another very good show. Part of each of these three lots is good and bearing fine cedar. Here and there along the top of mountain from lot 6 to lot 16 the rocks are partly mixed with apatite, but the sediment is so deep that we were unable to get at the solid mineral, but it appears to drop down through here. In Range VI and the feldspathic and quartzose gneiss is red—apatite appearing here and there all through. On these lots there is a belt of rock running north-east for about one mile, the average height being about two hundred feet, all quartzose gneiss, intermixed in some cases with orthoclase and specks of apatite. In lots 15, 16 and 17 there is some fine flat farming land covered with large quantities of good pine and cedar. From lot 18 to lot 24 apatite was not found in paying quantities, but the rocks on 19, 20 and 21

give such indications that there cannot be but heavy phosphate, considering the good shows. On these lots there are large quantities of good black oak, and on top of mountain, untouched by lumbermen, some fine pine, also some good farming land. There is apatite on lots 24, 25 and 26: on lot 25 in three distinct places. On west ends of lots 23, 24 and 25, apatite was found with pyroxene and mica on a belt of rocks bearing nearly east and west, with an average height of about twenty feet. The gage-rock is in some cases flesh-colored spar. The apatite can be seen in many places (four of these being very strong shows) together with the hanging-wall, it dips at about 30° north-east. In the centre of these lots apatite was found in eight places, the wall-rock being very rich micaceous gneiss; but on account of the depth of the sediment, the extent of the apatite-bearing rocks was not ascertained. There the gage-rock appears to dip or slip into quartzose gneiss, the apatite slightly mixed alongside of pyroxene and mica; forming what is without doubt, a very good formation. The land of about half of these lots is good, and bears plenty of pine, cedar and tamarac.

The apatite appears to cross the south halves of Ranges V., VI. and VII. in three distinct belts:—

(1) It strikes first from lot 3 on Range VII. to lot 4 on Range VI.

(2) The next strong place is lots 13 or 14, Range VI., and from that it steps down to Range V., making strong for Scalier Lake.

(3) Then from Range VII., lots 18, 19, 20 and 21, it steps down in direction east north-east on Range VI., lots 23, 24 and 25, still keeping [illegible] through Range V. [illegible] of Lake [illegible].

From lot 25 to lot 30 the average half of each lot is good land. From lot 30 to Providence Lake the land is partly rough with some very good timber; the rocks, mostly feldspathic and quartzose gneiss with beds of pyroxene and mica, [illegible] out here and there. From Providence Lake to lot 58 the apatite steps down stronger, and near the north end of Sanluche Lake it appears to crop out strong and heavy and in continuous veins of a [illegible] width of a foot.

RANGE V.—On lots 6 and 7 running into Scalier Lake apatite was found with crystalline limestone running for thirty feet, east, and down into the lake. The rocks across the lots from 7 to 13 are rich in apatite and some [illegible] will be struck here. There are some lots between [illegible] and 13 supposed to be owned by private individuals and openings have been made, but we were unable to ascertain the exact numbers of the lots, but we believe them to be all Government land. From lot 13 to lot 22 apatite will be found in many places showing up strong and in good shape. There are some very heavy deposits on lots 20, 21 and 22. The next grand stand the apatite makes is on lots 25, 26 and 27 and thence extending to Cruche lake. Around here the gneiss rock appears twisted and contorted in many ways, and in some places somewhat decomposed approaching to rust. Heavy deposits of apatite [illegible] around or seen here. From Cruche Lake to the end of the township on this range the land is level, good for farming purposes and heavily covered with timber, the soil generally extremely rich.

RANGE IV.—On this range the former [illegible] think that phosphate cannot be found in paying quantities up as far as lot 50 except that judging from the run of the apatite in Range V. something might be expected between lots 27 and 38 on the west ends of the lots. From 50 to 58 is a continuation of the fertile valley described in Range V.

RANGE III.—The first part of Ranges III and II is very rough and mountainous, mostly hard and tight feldspathic gneiss, with no signs of apatite; all the timber burnt, except about two lots of hardwood. The gneiss appears discolored and very dry, with some little crystalline limestone, partly mixed in some places with poor and sulphur-colored mica—against apatite at all times.

From lot 48 to lot 58 is a continuation of the above-mentioned fertile valley, low hills bordering it rich in the mineral.

RANGE II.—Apatite was found in many places on lots 51 to 58. All the gauge rock around here is micaceous gneiss, intersected here and there with heavy beds or bands of pyroxene, mica and highly heated hornblende, mixed with fine samples of very highly crystalline [illegible], the first of this mineral we have seen in this township. In some places iron pyrites can be seen, also the first we have seen in this township, and some signs of the mineral sphene. These lots will turn out well, as the minerals are very dark colored, have been highly heated, and the seeds of the seams are fibrous. There has been a great commotion here, and in these places stands have been made by the conflicting upheaval of minerals.

RANGE I.—Owing to the infiltration made by the minerals in Range II, some of the apatite-bearing rock has jutted out into the back parts of lots 51 to 57 of Range I. In some places it may be found strong, but it does not appear to crop out near the river.

The tunnel [illegible] well arranged for drawing the mineral from the mines, many [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] and in some cases mining roads already exist.

The land, both [illegible] [illegible] [illegible] is of a very good quality for farming purposes, with the exception of [illegible] strip [illegible] [illegible] [illegible] which [illegible] [illegible] being so now all light and [illegible].

TOWNSHIP OF BIGELOW

RANGE I.—Lots 1 to 6 inclusive, of this range, belong to Ross Brothers. On lots 7, 8 and 9, there is a bluff of rocks about one hundred feet in height and nearly perpendicular. Here and there, along the bluff of micaceous and feldspathic gneiss, for one hundred and fifty or two hundred yards, we found apatite, with mica, pyroxene and crystalline pyroxene. In some places the rock is quartzose gneiss, mixed with pyroxene and mica. These rocks are rich in apatite and the lots are covered with fine hardwood, and a very good quality of basswood. The phosphate vein strikes west to Range II and through to Bowman.

RANGE II.—We struck apatite mixed with pyroxene, mica and spar in six or seven places, along a ridge running through lot 1. The gauge rock is mostly feldspathic, mixed with some very good micaceous gneiss. Good hardwood bush all around here, pine mostly all cut.

On lot 14, about 300 yards from the river, there is a small mountain, say fifty feet in length, extending westward and discolored with rust. In the east end of it, there is a very good lead of apatite running east and west, down side of mountain. In some places where the earth has been scratched off the apatite can be well seen and is strong, and on south-east side of the mountain, and low down near the level land, undercut as it were, the rusty feldspathic gneiss, bands of calc spar and crystalline limestone, bearing east and west, is visible. A strong show could probably be found here, although some of the

mica has rather a silvery appearance. Further west is all apatite-bearing rocks, until the back of the rock is reached; these lots are of undoubted value.

Lots 27 and 28 are just below the rapids on the Aux Lièvres, and we have a water power of magnitude. On the opposite side in the township of Wells, the foot of the rapids is closed in by a high range of hills.

Lots 22 and 23 afford the best facilities for landings and sites, there being a trail from them out to the Government road.

Lots 29 and 30, Range II, together with lots 29 and 30, Range I in the township of Wells, embrace the rapid "De Croche". The fall here is about twelve or fifteen feet, affording another very valuable water power.

Lots 44 and 45, Range III, together with lots 44 and 45, Range A of Wells, contain the Iroquois Rapids, which extend for about two hundred and fifty yards along the river with a fall of about twelve feet. There are numerous water powers of lesser magnitude. Hard wood in abundance.

Range III.—We struck apatite in rather a faint shape on lot 14. Keeping west and south-west, to White Fish Lake the rocks are all apatite-bearing, but the sediment is deep, and only in places can the rock be seen. Explorations will undoubtedly pay here. From lot 1 to lot 12, the land is level, good for farming, and has very fine timber.

With reference to Ranges II and III from lot 25 to 35, between [illegible] and the river, on lot 34, Range II, a vein of calc-spar was found a little discolored, loosely crystalline and hard. The vein [illegible] some distance on [illegible] side, [illegible] of a very dark and [illegible] pyroxene. [illegible] runs due east and [illegible] north-east say 35 and can be traced many hundreds of feet down to the lake, and out to the river. These calc-spar veins are important [illegible] for many [illegible] we struck south-west. Near the centre of lots 25 and 26, Ranges II and III ridges of feldspathic and quartzose gneiss bear east and west in a well defined shape, about twenty to twenty five feet in width. The south side of each ridge is vertical from four to six feet and straight for hundreds of feet in some cases, with [illegible] square rocks dipping west at about 80° showing that the drift or current from east to west was sharp and far made ground, leaving [illegible] chance for us to get the apatite although the rocks have an apatite-bearing appearance. Tracing back into the west side of lots on Range III we struck due north across lots to 33 finding only pockets of apatite, the rocks [illegible]. The current has here [illegible] a greater depth than any [illegible] has been yet observed in the Ottawa locality and not till by means of diamond drills, [illegible] have been put down [illegible] six hundred to two thousand feet, to see [illegible] reach the dead rock anything more said by me at this time about this subject, will appear as idle speculation. [illegible] the dead rock is reached we think [illegible] to say that [illegible] of the depth [illegible] found here apatite will and can be found, and further state that until such depths have been gone down to, by some party or parties, [illegible] will [illegible] begin to [illegible] the [illegible] of those [illegible]. Thus [illegible] have carried away the calc-spar and pyroxene (as no signs of them could be found on the surface) until some strong wall of gneiss

a trap has forced them up. Here is the only chance of finding the minerals mentioned.

Ascending lot 41, Range III, up mountain which is part of a high ridge (say three hundred feet above lake), after getting up and over the top, we struck west along lake as far as west end of lot 49, Range IV, then north-east as far as lot 45 in Ranges III and IV [illegible] south to river, finding only stones of apatite. This ridge is too rough, solid and dry for any chance of finding apatite in large quantities or decided veins.

Finally in the Township of Bigelow we recommend that Ranges III and IV be further explored from lot 45 to lot 64, and Range V from lot 18 to lot 34, no part of which has been travelled minutely but on which we believe phosphate can be found in good quantity, the indications being good.

TOWNSHIP OF WELLS.

We next prospected from lot 8, Range II, up the west side of River des Ours, to lot 13, and from 13 crossed over to 16. Near the centre of lots 15 and 16, Range III, the apatite crops out strong in over twenty places, there being some magnificent shows in well-defined veins. The gage-rock is feldspathic gneiss, very much discoloured with rust, partly oxide of iron and manganese, but as depth is reached the rust will disappear from the apatite. The apatite here is of a bright bluish color, [illegible] crystalline and very [illegible] say 88 per cent. The ridge on [illegible] of [illegible] is very high, much contorted, [illegible] and broken up. [illegible] We went over this place very carefully and are able [illegible] of apatite [illegible] acres. River des Ours [illegible] lots [illegible] Range IV [illegible] We carefully looked up [illegible] river as the water was very low, bottom rock [illegible] dipping [illegible] north [illegible] about 36°. Above [illegible] crystalline limestone [illegible] in heavy beds for about [illegible] north-west, the mountain [illegible] very abruptly. Here [illegible] dipping [illegible] north [illegible] fifty feet high and [illegible] of [illegible] and [illegible] and feldspar [illegible] the [illegible] before, strong [illegible] and at going west [illegible] from [illegible], [illegible] compact and [illegible] Range II [illegible] places [illegible] phosphate were found along top of mountain. In one place [illegible] weighing [illegible] say ten tons in weight—partly quartzose gneiss, which [illegible] does not appear to belong to this formation. From here the apatite appears to dip and strike right across the river to Bigelow lots 7, 8 and [illegible] Range I. On lots 8 and 9, Range II of Wells, there is not much [illegible] apatite, but fronting as they do the two rivers, we consider them most beneficial valuable for [illegible] and working. Some of these apatite-bearing rocks were first found by [illegible].

There is a series of rapids on the Des Ours River extending for about three hundred yards through the lots recommended, the total fall being probably about sixteen feet. This would give a first-class water power. At one point a head of ten feet could be very

easily maintained the whole year. All kinds of hardwood abound. At the north-east and south-east sides of two of Mr. James MacCabe's lots we partly overhauled two very large apatite-bearing mountains, and dug up ten or fifteen pounds of that mineral. The gangue-rock all around here is feldspathic gneiss, with heavy beds or bands of pyroxene, and half mica and apatite mixed, showing out in every conceivable shape on surface, and much charged with rust. We may say that what we saw here, if properly worked, will be found to be a mine of wealth, and will satisfy any reasonable mining operator.

To conclude, this township, as far as our information goes, we believe that phosphate may be found crossing from lots 16, 17 and 18, Range I of the township into Bigelow, and that it can be seen near the banks of the river Aux Lièvres, but we are unable to give definite information. The eastern side of this township should be further explored and thoroughly; and if apatite is found there in paying quantities, the explorations should then be pushed still further eastward, to find, if possible, the whole length of this belt.

As far as we have seen in Wells, up to lot 36 the land is only fair for farming purposes, but above that it becomes heavier and more fertile, as we near the end of the township.

General notes on the Apatite-bearing Belts [illegible] Range [illegible] the Ottawa Region

From a mining point, what we term a belt, is a mineral which must have travelled from east to west, and in so doing, where heavy walls or dikes of gneiss were met with the apatite made for the surface in conjunction with other minerals, and a clearance has been effected. These surface shows are the mines of the present day. In some cases the mineral took side spurts off this belt, both north and south, until the clearance above mentioned was effected.

In travelling through Bowman, from west to east, these belts are found to strike strongly from Range VII into Denholm in the following places: From lots 2 and 3, from lots 7 and 8, from lots 18, 19, 20 and 21. There is also a belt striking across from lots 24 and 25, and farther north-east, in Range VII, up to White Fish Lake, the land being nearly level [illegible] in the line of this belt, the mineral must have dipped below, and [illegible] explorations tend to prove this theory.

Again from lots A and B, Range V of Bowman, down through Range IV to the High Falls some very strange and peculiar upheavals may be noted. This belt here appears to have been pushed or pushed south close down to bottom of the falls in Portland West. Over the river [illegible] west end of Villeneuve, there are no signs of apatite for three miles back, all the rocks having suffered much, [illegible] are blackened from great heat and partly red coloured, and in some cases the gneiss is partly mica with a sooty appearance. No apatite could have been formed here [illegible] the surface. We recommend that the east end of Villeneuve be again explored by parties, and if large deposits of apatite are found, these leads or belts should be followed up both east and west, until the whole township has been traversed. We are not at present able to make any safe statements regarding the resources of this township, neither as to the number of [illegible] belts nor what they

extent may be. Judging from present knowledge, the apatite-bearing belts of great depth and richness (if fairly put to test) lie between the Gatineau and Aux Lièvres rivers from Buckingham, Templeton and Hull, up to front of White Fish Lake. A little below White Fish Lake this apatite-bearing formation widens out both east and west and will be found to strike strong from Lake des Ours west to the Gatineau. These statements are founded on reliable information, and we regret that we have not been enabled, for want of time, to put them to a real test this fall; however, a party should be sent out in the spring to extend the amount of information already obtained.

In conclusion we would say that mining capitalists should procure diamond drills and start a series of borings in the various townships and at different angles, so as to arrive at as it were the average thickness as well as the depth of the veins of these great phosphate belts in Ottawa County. This is necessary in such an enterprising and progressive age as the present, if we wish to fully develop this branch of industry to obtain good returns for the amounts of capital invested.

In the methods of mining great improvements can yet be made. The antiquated methods should be laid aside, and steam drills, batteries, and compressed air, when required, should be brought into use. One steam drill will, in good hands, in an open pit, do the work of fully eighteen men, and in a drift much more.

We are of opinion that little profit will accrue to the individual enterprise. There are thousands of lots upon which phosphate exists, but the great mines are few, and can only be successfully worked by companies having approved and modern appliances, including for development with certain results, the diamond drills, &c., before-mentioned. As to Wells, Bigelow and McGill we know little, but we are inclined to the opinion that Denholm, and the country north of the townships above mentioned, will prove of great interest, the indications noticed by some of our party and the reports current, tend to mark that region even more prominently as the phosphate region par excellence, but it is more than likely that the mineral will be found at greater depths, and with generally less mountainous and ordinary surface indications. In resuming these explorations next year, the townships of Denholm, Hincks, Cameron and Blake mentioned should be taken up, and for the reasons heretofore outlined.

Before concluding we would impress upon you the importance and value of the timber in the district visited, comprising maples, cedar, tamarac, oaks, hemlock, beech, birch, basswood and the usual pines. In the area traversed at least 3 or 4 million ties for railway purposes may be had, and the other timbers for trestling, culverting, &c., &c., are there likewise in great quantity. The hemlock and oak bark alone would in themselves create a large and profitable business. The waters are teeming with fish, for the home market, and large and small game appear to be plentiful.

OTTAWA CITY AND JAMES' BAY

[illegible] Valley Railroad Company in addition to the [illegible] of their main line, have in contemplation the [illegible] survey from the Desert River, the [illegible] of the road to James' Bay, the distance from Ottawa [illegible] Harricanaw River route being about 450 miles [illegible] the most direct, but easiest of construction [illegible] traversing a tract of country full of valuable minerals of a highly [illegible] and offering an inviting field for the capitalist and [illegible]

Not many [illegible] North-western prairies, now the marvel of the world for their wonderful fertility and extraordinary production of grain [illegible] to the general public, and were given up [illegible] to howling desolation and perpetual frost. The [illegible] of them is very generally held to-day regarding our [illegible] region, comprising 80,000 square miles [illegible] between James' Bay and the Height of Land north of Lakes Superior and Huron. Yet [illegible] accumulating facts are likely to prove [illegible] of Ontario is exceedingly valuable in timber [illegible] and mining resources, and capable of sustaining a [illegible] agricultural population. The recent geological [illegible] a most valuable mineral region lies within [illegible] very large area [illegible] the main [illegible] over 300 miles in length —which [illegible] of the Ottawa, Muskoka and [illegible] unbroken [illegible] and only [illegible] north-west of James' Bay [illegible] agricultural [illegible] forest wealth of the country is [illegible] field for the lumber [illegible]

[illegible] MINES.

It is exceedingly gratifying [illegible] recently published report [illegible] Bay and up to the eastern side of Hudson's Bay [illegible] great deposits [illegible] coal [illegible] together [illegible] water freight which the [illegible] may afford the [illegible] James' Bay [illegible] another [illegible] may make [illegible] after referring to the [illegible] forests of the district, says [illegible] however [illegible] in the future the greatest of the resources of the [illegible] of Hudson's Bay [illegible] has yet been [illegible] for the [illegible] of these regions. In 1875 I found a large deposit of [illegible] on the [illegible] River. In 1877 [illegible] supplies of good manganiferous [illegible] ore were discovered on the [illegible] East Main coast (the [illegible] coast along the eastern [illegible] of James' and Hudson Bays) [illegible] of galena [illegible] and [illegible] Whale [illegible] Traces of gold [illegible] molybdenite [illegible] copper were [illegible] noted on the

East Main coast. Lignite was met with on the Missinaibi (a branch of the Moose), gypsum on the Moose, and petroleum-bearing limestone on the Abitibi River (another tributary of the Moose)." Another explorer referring to the great iron, coal and other minerals of the neighborhood of James Bay says: "I have no hesitation in pronouncing this district the richest mineral region in the Dominion, perhaps on the continent." Anthracite and iron are found along the rivers south of James Bay, a gigantic outcropping, containing over [illegible] per cent. of pure iron ore, displaying itself along the Moose, and a magnetic island on the Abitibi rendering the surveyor's compass useless. To Ontario this immense mineral wealth is likely to yet prove an important factor in her prosperity, particularly as Moose Fort is only 500 miles from Toronto, and on the completion of the connecting link the Canadian near Lake Nipissing, a Moose Factory Branch over 300 miles long, from near Nipissing, or a branch only 300 miles long from near Nipigon, will with the Pacific Railway furnish a short route to the shores of James Bay.

THE GREAT NORTHERN FOREST

The great forest which bounds Hudson Bay on the east and extends up the interior of East Main and Labrador to Ungava Bay and Hudson Straits, six hundred miles north of Moose Factory, attains its greatest characteristic, developing just south of James Bay, which lies nearly midway between the northern and southern limits of the [illegible] trees which compose the great northern woods. Some trees, such as the Banksian pine and the spruce, which along their southern limits in Canada [illegible] are almost valueless, [illegible] have become giants of the forest and are valuable for timber. The list of trees which flourish at James Bay or [illegible] drainage basin includes, according to Prof. Bell, [illegible] spruce (two feet or more in diameter), the tamarac, balsam, poplar ([illegible]), Banksian pine [illegible] white pine and red pine, and of lesser importance the [illegible] mountain ash and mountain maple. As James Bay is as near to Liverpool as is Quebec, the future of this district as a lumbering country looks hopeful.

WARMER THAN [illegible]

Such being the great wealth [illegible] forest [illegible] is likely to be developed some day [illegible] the question arises,—are climatic conditions sufficiently favorable for [illegible] which will be necessary to sustain the large population which may flock to James Bay territory. Prof. Bell [illegible] spent [illegible] Hudson Bay [illegible] they are. That many considerable [illegible] successful experiments in wheat-growing have succeeded at some [illegible] Moose Factory [illegible] the extreme north of the Moose drainage basin, [illegible] 51 16, the same as the [illegible] and further [illegible] Battleford. Its winters are not colder than those of [illegible] generally, and are warmer than the [illegible] and Peace River [illegible]. The average temperature for the year ([illegible] 6) is higher than that of many parts of the best wheat-growing land of the North-West and [illegible] than four degrees colder than that of Winnipeg—a difference [illegible] perceptible [illegible]. The southern part of the [illegible] Bay district is further south than Manitoba and on the same [illegible] as districts in Quebec, where wheat and even Indian corn are grown every year. The "fertile belt" of this district is a gently undulating plain [illegible] sandy [illegible] and lies in the same latitude as Winnipeg.

If wheat in Manitoba is an assured success every year it is reasonable to suppose that James Bay district, with its large area of fertile soil, cannot be without agricultural value.

The scantiness of the population has prevented agriculture being tried. Fortunately at one point—Moose Fort—but on a "low, wet, clayey soil, exposed to icy winds," a careful record has been kept for several years, and it furnishes a test of climate much superior to that which casual experiments in agriculture would afford. The figures and comparisons given hereafter are chiefly compiled from the three latest meteorological reports, and embrace the years 1878-79-80, a sufficiently long period to exclude the possibility of much mistake regarding the general characteristics of the climate.

WINTER AT ST. JAMES' BAY

The winter usually begins in the early part of November, but sometimes not until the third week. November and December are snowy months, but after New Year's, excepting in one year when January was snowy, the snowfall has not exceeded a few inches. The total snowfall is much the same as Toronto, although a greater depth is on the ground at one time. Rain is rare in midwinter, although not unknown. The mean temperature of December, January and February is 0°.1, while that of Winnipeg is 1°.8, or little more than two degrees warmer. The mean of Dunvegan, in the celebrated Peace River country, is 7°.5 below zero, or nearly eight degrees colder than Moose Factory. In extreme temperatures Moose Factory is not so cold as Winnipeg, the lowest being 45° below zero, while Winnipeg shows [illegible] below. Dunvegan registered 66° below zero in 1880. As low extreme temperatures as Moose Fort knows, are recorded in the colder settled parts of Ontario.

THE NORTH WINDS OF SPRING

In March occasional temperatures of 40° to 50° above zero indicate the approach of spring. In the early part of April the ground becomes bare, but the weather is exceedingly disagreeable and variable until near the middle of May, cold and warm winds rapidly alternating. This is due to the fact that James Bay, being exceedingly shallow except in the long deep, is partly frozen all over its whole width—150 miles—and northward to its junction with the deep open waters of Hudson Bay, presenting in this respect an analogy to the northern end of the Caspian Sea. The cold in spring remains solid on the bay and the cold air flowing from it is drawn southward by the greater heat of the Moose River basin. North winds are thus the prevalent winds during April, May and June. In this respect the immediate neighbourhood of the Bay resembles Cape Breton and several other parts of the Maritime Provinces whose spring is retarded to an almost similar degree by the cold winds from the icy currents flowing down the coasts. In May Moose Factory is 4 degrees cooler than Prince Arthur's Landing, but inland, where the cold north winds are lost, we have there this month like the rest of the spring in Ontario. Farming at the Fort begins about the middle of May, and the last severe night frosts occur before the month is over, and temperatures of nearly 80° in the shade are sometimes reached.

WARMER, COOLER THAN EDINBURGH.

Summer may be said to begin with June, although the freezing point is touched about the beginning of the month in most years, as it is in the North-West, and in several parts of Ontario not far from Toronto. The summers at the Fort are not so warm as fifty and a hundred miles inland, and are cooler in June, July and August than at Winnipeg and in many parts of the North-West, but warmer than at other North-Western districts, or at Edinburgh, Scotland.

The following table shows the mean temperature at various places, and will prove interesting for comparisons. The foreign stations are from Blodgett; all the Canadian stations, excepting Edmonton and Fort Saskatchewan show the mean, not of one year but of three—1878-79-80—and may be taken to represent the usual summer climate.

	JUNE.	JULY.	AUGUST.	MEAN.
	deg.	deg.	deg.	deg.
Moose Fort	54 0	63 0	58 5	56 2
San Francisco	58 8	57 0	62 3	59 6
Edinburgh	56 9	58 7	56 3	57 3
London, England	58 7	59 4	62 1	61 1
Wick, Scotland				54 [illegible]
Truro, N.S.	57 1	62 8	62 8	60 8
Prince Arthur's Landing	56 0	64 8	62 1	61 [illegible]
Beatrice, Muskoka	59 3	65 [illegible]	61 8	62 3
Winnipeg	63 9	67 3	63 9	65 1
Edmonton			54 4	
Fort Saskatchewan			56 8	
Toronto	63 3	69 4	66 9	67 5
Windsor	67 5	73 7	71 0	70 7

THE LIMIT OF PROFITABLE WHEAT FARMING.

Wheat requires for its ripening in Scotland a mean temperature for three months of at least 55 degrees, and in the interior of continents a temperature a few degrees higher so as to counterbalance the effects of the chill evenings occasionally experienced inland. It would, therefore, appear that although wheat would readily ripen and produce a good crop some years at Moose Fort, the mean temperature of the place might render it a rather precarious and not very profitable crop. Moose Factory, however, is surrounded by a low, wet, cold clayey soil, and exposed as well to the cold winds from the Bay. Beyond doubt the inland valleys with their warmer soils have a temperature in many localities as favorable for wheat growing as some parts of England and Scotland where it is a staple crop.

OATS AND BARLEY, HARDIER CROPS.

The average temperature required for wheat is at least five degrees greater than is required for barley and oats. These crops succeed far up the Mackenzie river beyond the Arctic circle in Norway and in the northern counties of Scotland, where the summer mean is only 52 to 54 and the month of June is sometimes as low as 45 or 6° lower

than at Moose Factory. Oats appear to be as sensitive to frost as wheat, and if it can be shown that the climate of Moose Factory compares well in exemption from frosts with localities where oats succeed well, the general high temperature of the summer months will guarantee the full success of the oat and barley crops in the James Bay region wherever a proper style of farming is pursued.

CONTINUOUS EXEMPTION FROM FROST.

Taking the average dates of the occurrence of the last temperature of 32° in spring and the first fall to the freezing point in the close of summer, we find the following to be the average periods of continuous exemption from black frost for the three years 1878-80:—

	Last 32 deg.	First 32 deg.	Continuous Exemption.
Moose Fort	June 6	Sept. 26	112 days.
Winnipeg	May 14	Sept. 15.	120 "
Prince Arthur's Landing	June 2	Sept. 13.	103 "
Beatrice, Ont.	June 6	Sept. 7	93 "
Pembroke, Ont.	May 16	Sept. 28.	135 "
Hamilton, Ont.	Apr. 17	Oct. 20.	186 "

From this it will be seen that Hamilton and Pembroke far excel Winnipeg in exemption from damaging frosts, yet the exemption at the Prairie Capital allows of the growth of not only oats, barley, and wheat, but even of Indian corn. Beatrice, Muskoka, grows with profit all the grains excepting corn, yet it has a continuous period of exemption from frost nineteen days shorter than Moose Factory. Even Winnipeg exceeds it by only eight days. [illegible] celebrated grain district around Woodstock, Ontario, experienced a temperature lower than 32° on June 6th, 1878, and June 7th, 1879, or [illegible] the mean average date at Moose Factory. It will be noticed, too, that owing to the neighbourhood of melting ice and cold water in James Bay the last frost of spring is later than at Winnipeg or the Ottawa region, it is no later than in Muskoka, while the first black frost of autumn occurs on the cold, wet clayey soil of Moose Fort [illegible] not till the end of September, nineteen days later than in Muskoka and eleven days later than at Winnipeg. The long frostless period at Pembroke compared with the shorter season farther south suggests that on warm soils inland from James Bay the frostless season may be even longer than at Moose Factory.

When the lowest temperatures of the summer months are compared the result is equally favourably to James Bay. Thus while the average lowest reached between the 1st of June and 1st of October at Moose Factory is only 29.2, or less than three degrees below the freezing point, Beatrice, Muskoka, shows 26° in June and 27° in September. In July and August the average coolest is 40°, quite as high as in many parts of Ontario, and higher than in most parts of the North-West. The absolutely lowest reached in the season in the three years was 21° at Moose Factory, while Truro, N.S., Muskoka, Prince

Arthur's Landing, Fort Calgary, Dunvegan and Edmonton, all were decidedly lower. In Muskoka and at Edmonton black frost occurred in August, and at Fort Calgary every month during the season 1880. Moose Fort had no frost any year before the middle of September. In the central counties of England last August 32.5 was reached in districts where wheat is a staple crop, while in the north of Scotland hard frosts are sometimes known in midsummer, though oats and barley are grown extensively. The facts stated prove that for at least oats and barley the climate of even the northern part of the vast Moose River basin is admirably suitable, and they indicate that even wheat cultivation may be found practicable on warmer soils inland.

Hot waves are as frequent and almost as intense as at Toronto. The average highest in May is 75, in July 88, in October 74. The average highest in Toronto in July is only 91, and in October is 69 — or five degrees less than James Bay. Evidently our supposed hyperboreans have occasion to know the value of ice cream.

If the cold waters of James Bay retard the Moose Factory spring, they make compensation in autumn by protecting the coast from the cold northern blasts, and by prolonging the genial fall weather. In fact the shores of the Bay enjoy

A MILDER AUTUMN THAN MANITOBA,

or any part of the North-West, excepting Fort McLeod. The first light hoarfrost at Moose Factory occurs not till about the 6th of September, and the first [illegible] till the end of the month or [illegible] as late as in most parts of Ontario. In October the days are [illegible] and occasionally decidedly warm, and the night frosts at the [illegible] of the month not so severe as at Winnipeg. The beginning of November is usually mild, [illegible] as the month wears on towards the [illegible] winter sets in with snows sometimes heavy, and the thermometer dips towards zero. Before the month is over the river is generally frozen, and the winter, which is much rougher than in Toronto, fairly sets in.

High temperatures in the fall months are not uncommon. The average maximum for October is higher than at Toronto, and in 1879 was actually up to 81.9, or higher than has been known in Toronto in over forty years.

The following table shows the mean temperature of autumn:—

		Sept.	[illegible]	Nov.
		Deg.	Deg.	Deg.
Moose Fort,	8 years	53.9	41.3	31.8
Winnipeg	3	60.8	38.9	21.3
Battleford	6	46.0	36.9	19.6
Fort Macleod,	6 "	54.6	40.0	27.2
Fort Calgary	1880	47.2	36.1	
Fort Edmonton	1880	56.4	41.2	21.5
Dunvegan,	1880	46.0	39.2	[illegible]
Toronto,	8 years	59.1	40.[illegible]	34.1
Windsor	3	62.0	45.6	36.0

The figures presented furnish unequivocal testimony to the suitability of the climate of much of the James' Bay district for barley, oats, and various other staple crops.

If actual experiments at some points have failed, the cause may be found in ignorance or carelessness in conducting them. Of several hundred farmers at Edmonton, only a few took the precaution to sow their wheat early in the spring of 1891; these reaped good crops in good condition and comparatively early, although the summer was cold, wet, and backward. The others (not practical farmers) who allowed their opportunities to slip by unimproved, had a late harvest and poor crops. Similar ignorance or neglect will produce similar results in all northern climates, where the season, while amply repaying proper farming, leaves little spare time in the warmer months to those who postpone ploughing or sowing a fortnight or so later than it can first be done.

[illegible] AND [illegible] HAVE [illegible] GROWN.

The evidence of the agricultural capacity of the James' Bay country, derived from actual cultivation is necessarily very meagre, but is on the whole encouraging. Wheat succeeds at Lake Temiscamingue, near the south-eastern border. Prof. Bell, when three hundred miles north of Lake Nipissing, was surprised by finding a Scotch farmer settled there for several years, located comfortably in the midst of a forty-acre clearing, and cultivating oats, barley, turnips, potatoes, and other vegetables to sell to Hudson Bay traders and Indians. The farmer had sowed wheat only once for an experiment, and it ripened well. As there was no mill, he had not since raised wheat as a regular crop. This farm is about 100 miles from James Bay.

Mr. George Gladman, who resided at Moose Fort for fifteen years, says the climate and soil there are good; potatoes and vegetables were raised in abundance, barley ripened well; currants, gooseberries, strawberries and raspberries are plentiful; wheat had not been tried; horned cattle, horses, pigs, and sheep throve. Last century Mr. Frost, who resided at the Fort for many years, stated in a book published by him that barley, peas, and beans succeeded well "although exposed to the chilling winds which came from the ice on the bay." In another book he says:—"Sown wheat [illegible] two winter frosts and grew very well the summer following, and black currants also have grown and some fruit." Mr Edward Thompson, for three years surgeon at Moose Fort, says he has seen far

BETTER BARLEY AND [illegible] AT MOOSE RIVER

than he ever saw in the Orkneys, but the quantity sown was small. "There was ground enough broke for corn (grain) but never any encouragement given for sowing it, but the reverse, the Governor forbidding it for no other reason than that if corn (grain) had been sown a colony would soon have been erected there." Prof. Bell in the latest of his reports which has come to hand, speaks very highly of the country for grazing and dairying. Besides the cultivated grasses it produces in some parts, particularly on the south-west and western shores of the Bay near Fort Albany, 40 miles farther north than Moose Factory, immense quantities of wild [illegible]. At Moose Factory oats, barley, beans, peas, turnips, beets, carrots, cabbages, and onions

are cultivated with perfect ease, while even the Imperial to [illegible] succeeds. As the soil and peculiar exposure of Moose Factory are unfavourable, the fact of this success augurs well for the future agricultural development of the more southern country inland. That all the flora is the same as that around Quebec is cited by Prof Bell as a proof of the mildness of the climate.

Finally Mr Alonzo Wright M P who is, perhaps, more conversant with all these facts than any other gentleman in Canada, has stated [illegible] very ably in respect of this northern region—indulging in [illegible] remarks—in his speeches in Parliament the honorable member [illegible] is a territory there

[illegible]

capable of affording homes for millions of people and Thomas Keefer Esq., C E, has given it as his opinion that the natural resources of the district as a whole are the most promising of any portion of Canada. Therefore under these and all the circumstances herein set forth, I respectfully submit the same for the earnest consideration of the Government and in order that the extent and variety of the actual resources may be no longer in doubt, an appropriation be made to enable a thorough and practical exploratory survey to be undertaken without delay.

J. MURRAY MITCHELL, C.E.

Engineer-in-Chief

[illegible] C. Railways

[illegible] 1882.

Notes on some of the Minerals of the Gatineau District.

IRON.—That this metal exists in large quantities is evident to every one who has examined the rocks. In many parts the quartzose rocks are so stained with the peroxide, that they might be taken for masses of red hematite. In other parts masses of ironstone are exposed on the sides of the lakes. In others veins of iron are found in the rocks. The horizon in which the beds of magnetite appear extend from Hull northwards to the Big Lake. The deposit at Hull is not only noted for its extent, but also for its superior quality and purity. Besides these deposits of magnetite, iron sand in large beds, and hematite is found in Maniwaki—at present an Indian reserve, but which, it is expected, the Government will soon throw open to settlement, removing the Red men further to the north.

APATITE OR PHOSPHATE OF LIME.—The County of Ottawa has for some time provided a great part of this important mineral shipped from Canada. The quantity found all through the district between the Gatineau and Lièvre is immense, and will be wonderfully developed when the two branches of the railway are completed. In some parts the phosphate is seen in the rocks through which the roads are cut; in other places, as near the mouth of Post Creek, on the Gatineau, as shingle on the river bank. In Buckingham it is found in large beds, and filling cavities in the limestone rocks. It is quarried in many [illegible] places, and proving very remunerative, large prices are given for lands known to contain it. This ore will always be in large demand, [illegible] which may be seen from the fact that immense quantities of phosphoric acid are every year taken out of the soil in wheat and other crops. The want of this phosphoric acid is considered, in a great measure, the cause of the comparative sterility of some lands on which large crops of wheat were formerly grown. From calculations made in 1870* it is shown that the shipments of corn and pulse from Montreal in the previous year represented the large quantity of 2574.0 tons of phosphoric acid of a money value of $[illegible]0,391. The export of wheat from [illegible] was only 7½ per cent. of the total amount received by England in the shape of bread corn, which altogether, therefore, represents an amount of no less than 34,300 tons of phosphoric acid of the value of $[illegible]. What an immense amount, therefore, of Phosphate of Lime is required every year to restore to the earth this large quantity of so important an ingredient.

PLUMBAGO OR GRAPHITE occurs in large quantities in Lochaber and Buckingham, sometimes in beds of good material, at other times disseminated, yet in paying quantities, and sometimes in lumps of the purest metal. Some of the material analysed by Dr Harrington of the Geological Survey was found to compare very favorably with the best quality imported from Ceylon. The use of this mineral is continually increasing. At present it is employed very extensively for writing pencils, for electrotyping purposes, for crucibles, for blacking stoves and as a lubricant, and thus there is always a good demand for it.

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*Canadian Naturalist, vol. V, p. 245.

Galena, the densest common ore of Lead, is found in many places in this County. Sometimes it is of so soft a nature that it can be cut into shape by a knife. It is in small quantity above Desert Village and at the N. E. of White Fish Lake, near the Big Lake, and in many localities in the Gatineau Valley. In Hinks a vein was traced for more than 100 feet. This ore is very often argentiferous, and a specimen from the Big Lake, when analysed was proved to contain a good percentage of silver.

Manganese.—This coarse, but useful metal, is employed extensively in calico printing as a mordant and in giving to silk some very beautiful dyes. It has been shown by different chemists, that by the action of different chemicals, it may be made to yield a great variety of fine coloring materials. As it has hitherto been found in only a few places it brings as much as $1 00 per lb. As the production increases and it becomes somewhat cheaper the demand will also increase, and a remunerative business may be expected. It occurs in some quantity in many townships, particularly in Hull.

Pottery Clay and Kaolin or China Clay.—From the large number of feldspathic rocks in Canada, one would expect that large quantities of the material so important to the potter would be found in the country. Such, however, is not the case. The feldspars have too much iron in them for the manufacturer and the few potteries in the Province, have to import their material, generally in the form of pegmatite rock from Cornwall and Devonshire. In many places, on the Gatineau, at Hull, Aylmer, Wright, Cameron, etc., a very pure kind of white orthoclase is to be found apparently admirably fitted for this work, and if mined and put into the market will perhaps, prove a great benefit to the trade.

Kaolin or China Clay for the manufacture of fine porcelain and useful for many other purposes in the arts, has recently been found on the Aux Lièvres in immense beds.*

Mica.—Although the Laurentian rocks abound with Mica, it is generally of an impure dark color, as of such a nature to be of little value. In the western part of the County I have seen very large plates of white mica above 10 inches square. Although they were not of first quality as regards clearness and transparency, having taken off the outside of crystals exposed on the river bank, they give great promise of good value at when the outside sheets are removed. This useful minerals is now in demand, and obtains as much as 6c per ℔ for good size sheets of first quality.

Asbestos.—Among the many minerals found in the County of Ottawa, perhaps none are more remarkable than the veins of Asbestos found in Wakefield, Dupuhem and on the line of Ottawa and Pontiac Counties. This material has only lately been brought into notice as of economical value. Specimens of this rock fibre were found some years since in Canada, but the hardness, and the coarseness of the fibre gave little promise of its becoming of any use. Of late years it has been found possible to manipulate and so much finer structure that the greatest skill has been employed to devise machinery to bring it into use. These efforts have been successful and the fibre has been

* Since the above was written, Kaolin in many places on the Township of Blake, Moffat, Wabasso and Hartley has been found and of a most excellent character.

J. M. M.

upon and [illegible] fabric upon which the fiercest flame has no power. It has also been formed into a kind of cardboard, into lamp wicks, [illegible] packing for the piston rods of steam engines, and a coating for steam pipes, for which it is well suited, being an excellent non-conductor of heat. It may be seen that the processes already employed [illegible] development to make this a very important and remunerative manufacture. With improved machinery and experience, finer cloth may be made, forming incombustible clothing for those exposed to flame or intense heat. It is intended also to apply metallic dyes, such as gold by heat, and so form not only an incombustible but also an elegant fabric, which may be the means of saving much life and property. It would be impossible to mention the many useful purposes to which Asbestos can be employed; hearth rugs, table covers, luggage, drapery, may be suggested. Its remarkable power as a non-conductor of heat will render the thick cardboard, when covered with a good design an elegant guard to save our woodwork from the heat of our stoves. Elegantly dyed cords and tassels of Asbestos would be a great improvement on the unsightly wires which retain our stove pipes in halls and public rooms. Again, the necessity of defending our [illegible] pipes from the destructive influence of the frost, points to the necessity for a non-conducting substance, which will prevent the heat being abstracted. It is also now used extensively in the manufacture of paints. The Asbestos found in Ottawa County is so valuable a [illegible] that the great [illegible] cannot be [illegible] sought for.

Limestone and Marble.—Serpentine has been found in the valley of the Ann Lievres, and at Desert Village. Some of the white crystalline limestones are of so fine a texture as to form a valuable stationary marble. Some of the coarser crystalline limestones appear so compact that they would no doubt bear a fine polish. At Desert Village is a choral limit of the stone of the country a very close, white limestone, which has just sufficient colour in it to make it pleasant and agreeable to the eye, and of a texture so hard as apparently to defy all the destructive powers of time and weather. A handsome green-veined Marble is also found in Denbeigh.

Coloring Matter.—Chiefly ochres (Hydrous Peroxides of Iron) are found in many of the Townships on the Gatineau, notably in Wright, Low and Denbeigh. They are found in a state requiring very little [illegible] to render them fit for use, and are of all shades of color from a light grey to dark red. At the present time good ochres are saleable at good prices.

Barytes is also found pretty plentifully between the Gatineau and Ann Lievres Rivers. It is used as a white paint and after some preparation, for is the permanent white of the artist. It is also used as an adulterant to white lead.

Iron Pyrites is said to exist in very large quantities in Wright and several other townships. No doubt this will some time be put to use, as is done at Shawinigan, in Ontario, in the manufacture of green copperas and of sulphuric acid, which might here be employed in reducing the native apatite to a form suitable to the wants of the farmer. This ferric sulphide often contains some small percentage of nickel and nickel, which, by improved methods may be profitably extracted.

The Forests of Ottawa County.

Ottawa County has for a long time been looked upon as one of the principal lumbering districts of Canada. The valleys of the Gatineau and the Aux Lievres, hold the chief places for this important industry. For several years their woods have furnished a large amount of the white and red pine produced. As soon as the rivers are open in the Spring the logs which have been cut during the winter begin their journey upon their swift waters and down the numerous rapids, till about the end of September, when the booms, towards the lower parts of the rivers, have arrested them in their course and hundreds of thousands of logs are enclosed, waiting to be sorted and forwarded to their owners. The lower parts of the County through which these rivers flow, have been partly cleared of the largest pine and [illegible], but thousands of smaller trees have been left, which are rapidly growing up, and many good sized trees still remain. The hardwood has scarcely been touched as it is too heavy to be floated, and there has been no railroad to take it to a market.

In the Valley of the Aux Lievres there still remain whole forests of tamarack, resembling the European larch and much used in ship-building, hemlock, birch, beech, oak, elm, cedar, and a good sprinkling of white walnut or butternut. From this part alone, more than sufficient timber to build both railroads (The Gatineau and Aux Lievres R. R.) can be provided, and with that in the Gatineau Valley give an immense quantity [illegible] and manufacturing requirements. The Railway will open a large market for all that can be spared. Even the smaller trees and timber unfit for other uses will find ready sale as cordwood. The hemlock is useful for railway ties and many other purposes. Its bark is in great demand by the tanners, and now that the supply of black walnut is [illegible] exhausted the butternut and birch will be much sought for and bring good prices. Cedar, of which large quantities still remain [illegible] throughout the whole district, will always find a good sale also. The ease with which it can be made into shingles and its property of power of remaining for years in wet ground without decaying, make it valuable for foundations and for railway ties, fence posts, etc. Good sized spruce and balsam are plentiful and very useful to the farmer for building his house, barns, stables and sheds.

For the necessary buildings of the Railway Company these woods will also be of great use. The poplar soon covers the country when the hardwood has been cut, and grows very quickly; this as well as the soft maple, is largely used in making pulp for the paper maker. It is also of use in the manufacture of furniture.

From what has been said it will be seen that all the woods required for ordinary use are plentiful, and will prove a great saving of expense in the construction of the Railroad, growing generally where they will be used; they will also save great time and trouble. The future settler will scarcely miss the timber removed from his land, and it will rather be an advantage to him to have his land partly cleared, and the necessary roads made to draw the timber out of the bush.

[illegible] 2 9 1968

MITCHELL — [illegible] COUNTY

HC.
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To Aleazo Wright Esq., M.P., &c., &c.

Sir,—

I have the honor to dedicate to you as member of Parliament for Ottawa County the annexed pamphlet, shewing the geology and mineralogy of the rich territory comprised within the said County of Ottawa. The ancient Province of Quebec has nowhere within its boundaries greater sources of wealth than in the county to which this pamphlet refers, and, if by your kind acceptance of this dedication the attention of the Government and the public generally is more closely drawn to the importance of the subjects herein referred to, the object which I have had in view will have been accomplished

I have the honor to be
Sir
Your obedient servant

J MURRAY MITCHELL, C.E

187581
20/2/24

OTTAWA & GATINEAU VALLEY RAILWAY

AND OTTAWA COLONIZATION RAILWAY

Office of the Engineer-in-Chief

GENTLEMEN

I have the honor to transmit for the information and guidance of the Directorates, the accompanying reports relative to the geology mineralogy and general features of Ottawa County and the territory north to James Bay with a view to the ultimate extension of the Ottawa and Gatineau Valley Railway to that latitude.

I have the honor to be, Gentlemen,
Your obedient servant,

J MURRAY MITCHELL,
Engineer-in-Chief

TO THE PRESIDENT AND DIRECTORS
O & G V and O C. Railways
Ottawa.

OTTAWA COUNTY

Its Resources and Capabilities

Exactly what area of country is comprehended under the above title cannot as yet be stated. Its northern limit has not been determined by actual survey and may perhaps be placed at the south west shore of St James' Bay, or else at the southern boundary line of the Hudson's Bay Company's territory at the height of land. If we give 14,000 square miles as its contents, we shall perhaps be near—certainly inside of—the mark for this last supposition for the northern boundary. Although it is the county which has paid the greatest revenue to the Provincial treasury it has so far received very little in return. As yet quite a large portion of it has not even been surveyed for settlement. Its natural wealth has been the cause of much of the neglect. The millions of dollars worth of timber its forests contained, has been reserved for the enriching of three or four firms, whose only care has been to bar ing out settlers, who might intrude upon their timber limits, and a steady resistance to all improvements which might direct attention to their monopoly and also enhance the value of the commodities they purchase in the district. This furnishes an answer to the query why so valuable a section of country is so thinly populated. Farmers must depend altogether upon the lumber trade. It is that which sets the value both on labour and produce. Of late years, railroads have been constructed in some localities, and this has struck a heavy blow at the lumberers power for improved travelling facilities have militated greatly against the nefarious "truck" system which is generally made the rule in backward places. Wherever it is possible for the produce to be brought to market, and for necessaries to be purchased without restrictions of truck or barter prosperity is invariably the rule. The Townships of Lochaber, Buckingham, Templeton, Hull, Eardley and West Wakefield may be cited as proofs of what I assert. There is no reason why the Townships of Egan and Kensington for instance, should not be as opulent and prosperous as any of these, had they the same advantages of travel. The soil is said to be equally good probably better and the land generally is not so rough. When the length of the journey to market has been reduced from four days to as many hours, we may expect the natural richness of the land to declare itself. At present these more northerly townships produce for sale only hay oats and potatoes, as these products always sell at the shanties. Very little wheat is grown there, although a late *Peer* of the district declared that sixty bushels had been reaped for one bushel sown. There is no rotation of crops, and the little farms are robbed of the material which should be returned to them in the form of manure. What wonder if the inhabitants of this end of the County are few, when the virtual rulers there are men whose interests clash so decidedly with those of the settlers. But the lack of inhabitants is

not an unmitigated evil In order to work the land it must first be thoroughly cleared of trees, and as pine is almost the only marketable lumber owing to the impossibility of floating the heavier hardwoods the maple oak butternut birch beech basswood, elm, &c. are rolled into heaps and burnt out of the way When the railways are completed, all these woods, now so largely used for ornamental and other purposes, will be of very great value, owing to the sudden failure of the supply of black walnut Black birch, the only satisfactory substitute, has almost doubled in value during the past few months. Had the land been cleared before railway communication with the trade centres was established, all the birch and other hard woods must have been burnt, and thousands of dollars lost to the country Every Township has some of these woods and many of them have immense tracts of birch, oak and maple of fine growth and quality Soon nothing but the mere brush need be destroyed as the demand for firewood in Hull and Ottawa will provide a ready market for everything else

We may reasonably expect also that the Gatineau Aux Lievres and smaller rivers will be found to furnish advantageous sites for mills and factories for the turning out of wooden wares and implements. Of late years quite an important and lucrative trade has sprung up in paper pulp. The whitest and most fibrous woods are chosen and taken to the mill in short lengths, then having been freed from knots and bark the blocks are brought in to contact with rapidly revolving coarse millstones and by degrees ground into minute fragments. Sometimes the wood is reduced to pulp by a more complicated process, necessitating a very high pressure of steam but the former is the commoner and probably cheaper system With this article Ottawa County could furnish the whole paper trade for years to come The woods at present looked upon as most useless, such as white birch, poplars and soft maple, are just what the business requires, and will doubtless be seen to have a real value, when the attention of manufacturers has been attracted to this district. On the line of the Quebec Central Railway the extension of the S E T & E R.R. a good trade is done in short logs of spruce and balsam, which are manufactured into packing cases for the English market There is no reason why the Gatineau line and branches should not bring thousands of feet of such material to the factories—at the present time there is an actual demand in Ottawa for an unlimited number of shingles for shipment to the United States. Cedar shingles sell for $2 75 pine for $3 00 per thousand This price offers so fair a profit that a gentleman of my acquaintance is actually fitting up a small steam mill for the manufacture of shingles during the winter, and expects to make money by it, though the shingles when made will be carted to Ottawa, a distance of over 60 miles What then would his profits be were the projected railway completed? And any number of such mills could be kept in operation in the County so far as the raw material is concerned Then there is no reason why hemlock bark which sells at from four to eight dollars per cord and oak bark much more valuable to the tanner should not be sent out of the County so soon as means of carriage have been provided. Taking these and other similar facts into consideration I feel sure that the woods of the country are yet to yield such profits as will agreeably surprise those who fancy the bush worse than valueless, after the pine and fencing cedar has been taken away

As at present situated, however, we can scarcely wonder at the antagonism shewn by the farmers to the trees. He knows that just where the bush is thickest, and the wood largest, he will find the best land. So with no market near, no means of conveying the timber to town, what wonder if he chops the trees, rolls the logs into heaps, and destroys them by fire. Invariably the first year's crop remunerates him for his trouble. The writer has seen oat and wheat straw seven feet high on new land, though the seed was only scratched into the ground with a heavy harrow. Indeed the crops thrown off by the farms in this country are, as a rule, wonderfully good. That the soil is rich generally speaking is proved theoretically by the presence in great quantity of crystalline limestone; practically by the luxurious growth of the timber. *En passant*, I might mention the fact that the huge pine board exhibited at the Great Exhibition, England, was cut from a tree found upon a well known limit in this County. True, a good third of Ottawa County is taken up by rocky mountains, which present a decidedly rough appearance to the dwellers in prairie-land districts. But the general excellence of the remaining two-thirds fully compensates for this rough portion; where cleared and farmed the crops are nearly always good. For instance, one farmer had 80 cwts. of flour (200 bush.) from 6½ bushels of spring wheat; another had 80 bushels from 2 bushels sown; and I could multiply instances indefinitely. Oats yield on an average 20 to 30 bushels to the acre; rye 25 to 30 bushels—root crops are always most successful. The arable land varies from light loam to heavy clay; from warm sandy to black muck. And then the hills are of very great service to the farmer. As soon as the snow leaves them in the spring, they are covered with sweet succulent grass; than which nothing could be better for cattle and sheep. In fact for stock raising the district could scarcely be excelled. The quality of the mutton about equals that of the Welch mountains, and if South Downs were introduced could be improved so to size, and so well fitted for the English market. At present prices are absurdly low; so low indeed that farmers, as a rule, keep only enough sheep to furnish their houses with flannels and wool, and sell the lambs at the end of the autumn. This year lambs sold at that time brought from $2 to $2.50 each (*i.e.* from 8*s* 4*d* to 9*s* 6*d* each). But then the buyer had to drive the flock from 50 to 90 miles to the nearest railway station. For sheep there is no sale at all; for beef the manager of one of the great lumber firms is offering this autumn $3 per cwt. though even in Ottawa it at present sells at from 4½ cents to 7 cents per pound live weight—already some of the more wide-awake farmers are preparing to participate in the cattle export trade. Stock is being improved, wintering capacity increased, and herds enlarged. It is felt that a share in this, the best paying of all the export trades, of right belongs to the County, though the lack of steam communication with the seaports has heretofore prevented farmers from taking part in it. There are now some of the finest Durhams the world has produced, on the larger farms along the Gatineau River, and the grades obtained by the union of these and the hardy well-built cows of the country will satisfy even the fastidious taste of the English butcher. In short, as soon as the road to a fair market is opened, there can be no doubt but that the inherent capabilities of the soil will be brought out much to the advantage of the farmer and the prosperity of the country.

But if all this were not the case, there would still be most power-

ful reasons for considering this the most valuable county in the Province. The minerals its rocks contain will certainly give it a foremost position even in the country—boasting the mines of St. Joseph, Bronson, Capelton, Thetford and Orford. Geologically speaking the rocks of the country consist of "alternations of gneiss, crystalline limestone and pyroxene strata," interstratified with several species of quartz, feldspar, &c. They contain many minerals of economic value, especially the following: hematite magnetic and titanic iron, galena, apatite, plumbago, molybdenum, mica and asbestos. Many of these rocks plainly show their igneous origin, and have been subjected to much attrition. Gravel beds of considerable magnitude and plains of coarse and fine sand complete the evidence for the glacial progress, which has ground down the once far loftier Laurentides to their present altitude. There are not wanting evidences also (*Vide* peculiar boulders mentioned in following report) of the presence of icebergs—upheavals, contortions, and fractures of the rocks are borne witness to on every side, by twisted overlapping and upright strata. Although therefore an interesting district to the geologist, it is the more laborious to the prospector on account of its irregularities. He must expect that the valuable mineral veins will partake of the character of the bearing rock—that is to say that a vein which crops out strongly in one place will be buried under strata of indefinite thickness in another—that a leading vein will end abruptly, where the layers of rock assume a vertical position &c. and therefore I cannot but conclude that to pass a verdict upon the wealth of the County limiting it to the mere surface indications, is to do it an injustice. Perhaps it is equally rash to argue from the seen to the unseen, but we may certainly hold that a plain "fault" does not of necessity imply the absolute loss, not even lodes-logically speaking, of the vein. Then the result of all explorations must be taken merely as comprehending the *displayed* wealth of the rocks. The remainder will not be manifest until leads have been laboriously followed, breaks in veins looked up, and what Colorado miners term a "pan rock" discovered in every instance; and then the numerous detached beds or pockets which exist (as I believe) will require to be carefully looked after by stratographical experts, who must also be experienced mineral hunters.

At the present time the most important mining industry in the County is that of apatite. Although dating back only some 6 or 7 years here, it has already assumed immense proportions, and is now steadily on the increase. Nor can this be wondered at when the wonderful productiveness of Canadian apatite is taken into consideration. A sample taken almost at random—from a heap on the wharf landing—of the High Rock Mine, Portland, gave on analysis, 80·785% tribasic phosphate. The product of another mine (in Buckingham) gave 41·080% phosphoric acid equal to 89·687% tribasic phosphate of lime. According to the official report of the Analyst to the Government Geological Survey, this is about the average yield of the apatite in this country. I give, in a note, a full report of the analyses in two cases, taken from the Report of the Geological Survey for 1877-78. For comparison's sake I may state that the well known mine of white (?) apatite, at Estremadura Spain, yielded but 75·601% tribasic phosphate; that of Staffel Germany but 76·270%, and the specimens analysed were I understand selected with some care. So much for the quality of the apatite. As far as quantity is concerned

the annexed report speaks for itself of the surface indications of the Townships examined. Information has been received respecting lands to the north of Bigelow which leads me to state that those who held that the apatite gradually decreased in volume northwards were most probably not altogether in the right. For instance, in North Blake a vein has been discovered running about N.E. and S.W., which affords excellent exhibits of phosphate. It is there associated with pyroxene and small quantities of dark mica the enveloping rock being reddish coloured gneiss, and occasionally flesh coloured calc spar. At the north end of the Penniehurgon Lake, an upright rock of tilted strata displays a beautiful vein of the vitreous dark-green apatite. I have seen a specimen obtained 40 miles above the Desert Village, on the Gatineau, crystalline and evidently extracted from a deposit of some extent. From lumbermen who have travelled miles beyond the prospectors' northern limit, I have heard of nameless rock-bound lakes, whose sides exhibit green apatite in veins of varying width. At the lower end of the County discoveries are constantly being made, though only a few *very* large deposits have been found.

As regards the demand for phosphate that I am assured, is unbounded. The multiplicity of uses to which it is now applied promises a ready and *pro rata* increasing market for all that can be found. Its richness places it nearly at the head of the price list and if any the poorer grades as *e.g.* the Spanish, must drop out. From the ease with which the Canadian is mined it should brook no competitor; and when the projected railways are finished it will be possible to place it on the London wharves for little if anything over $8.50 or $9 per ton. But at present the lack of direct rail communication with deep water navigation presents an almost insurmountable barrier to the development of the phosphate industry. The trouble and expense of handling such heavy material over country roads, in a rocky mountainous section effectually prevents the mining of far away deposits. The same may be said of the iron ore, of which assays show an unusually high percentage of metal. This, of course, cannot be mined to advantage, until the fuel is brought to the mouth of the mine by some cheap transport service. At present one of the many deposits of magnetic ore is being worked and the crude ore shipped out of the country. This is a loss all round. The ore is a iron refnee and all is freighted to the final. And then too, the Industry which should be providing labour for our own people is all to the benefit of another nation. As the report by Mr. E. T. Chambers shows the country is very rich in iron ore. The assays conducted at the Templeton and Hull mines, have sufficiently established the value of the ore—and so with regard to galena. An enterprising prospector discovered a promising deposit of galena, to the north of the Township of Blake. In miners' parlance he "stripped the show" and sunk a small pit. By actual crucible test, he established the fact of the argentaferousness of the vein but could go no further. The land just around is Government property (unsurveyed I believe) there are no roads near, the development of the mine required a large capital and as no Company would purchase a claim in such a remote and secluded district it has been abandoned. On the 5th Range of Wright, an exhibit of promising galena has been discovered and will doubtless receive the attention it deserves, as soon as the Gatineau main line has been constructed. On the 1st Range of Aylwin near the river a peculiar hard galena

has been found. Of less valuable minerals, the Blue Sea district, in Bouchette, affords a considerable deposit of pyrites in mass. This should be thoroughly tested, as it is impossible to say of what value it may not be. The quantity is sufficiently large, I understand to allow of its being worked to advantage for cobalt, if the percentage it contains of it is anything above a decimal.

A gentleman on the Upper Gatineau, who possesses magnificent beds of fine close grained limestone in Northfield Township, was offered $2 25 per foot for many tons of the marble delivered in Ottawa, but could not accept the offer, owing to the length and difficulties of the road. I sent specimens of a deposit of coarser marble to a leading stone-worker in Montreal, and was assured by him that a well-stocked quarry of such material was a very valuable property. The quantity at that place is unbounded; a stratagraphical geologist declared it to be an outcrop of the marble belt which turns up at Arnprior, and has become of such value there. From a neighbouring township I was shown specimens of a green veined and mottled marble which ought to command a very high price at no fair market.

Amongst the resources of the County we must certainly give place to the various colouring earths found within it. Beyond doubt, these are of very great value and will very soon prove to be important sources of revenue to the Province. Last year a United States chemical company was prospecting on ground in this very district with a view to the purchase of all these deposits. The colour (raw) of the earths, varies from very light gamboge ochre) to dark rich Indian red (peroxide stain). Nearly all the intermediate shades of yellow brown and red have been found and generally in very fair quantity. Range C of Denbigh, furnishes a faint coloured ochre; the XIIth of Lowe, dark red native; the Blue Sea country at least three other shades; the XIIth (?) of Aylwin a very dark and rich yellow. Probably many such beds exist, which have not yet been brought to light. I have seen several houses which have been painted throughout with colours obtained from the land, merely mixed with raw oil.

Of graphite or plumbago I must not allow myself to say very much, as this sketch has already run on to greater length than was intended. The Townships of Lochaber and Buckingham contain mines which have been worked successfully in the past, though ignorance on the part of employees, in some cases incompetency on the part of a manager, in another and too great speculation in other instances have caused all work, I believe to be suspended at the present time. Experts and members of the Geological Survey all agree that the quality of the plumbago is excellent, and the quantity unlimited. The second and third ranges of Hincks are also well furnished with this mineral. Of course for substantial use in such commanded general use, there is always a good demand.

And now in conclusion I think that although I have only glanced at the resources of the County enough has been written to shew that the building of two lines of railway, through it will be of the utmost importance, not only to the people of the district but also to the Province at large. It means the opening up of what is practically a new country and also an outpouring of wealth, which must result in a largely increased revenue an augmented population and the prosperity of its deserving inhabitants. Thousands of dollars, annually lost to the Province, will be saved. Government property will be more

than doubled its value and emigration, and above all colonization will be encouraged. After all, it is that, that this Province requires something to encourage its own sturdy, manly sons, to remain at home, and as soon as they find, that it is possible to do well on their native district, that they can readily obtain its real cash market price for every thing they can raise or grow, that the very bare rocks, open to their touch and disclose mines of wealth, that this labour has a high money value, the allurements of a neighbouring Republic, and the visionary hopes a prospect of the Great Lone Land, will alike fail to charm them away. It has been so often demonstrated, that it is now accepted as an axiom, that the railway is the greatest "civilizer," the greatest "colonizer" the world has yet seen, and the railways perhaps, never had a nobler object to perform, a more important office to fill, than now lies before it in Ottawa County

NOTE.

Analysis of specimen of apatite from the twelth range of the Township of Buckingham:

Phosphoric Acid[1]	41 080
Fluorine	3 474
Chlorine[2]	260
Carbonic Acid[3]	370
Lime	49 161
Calcium	3 805
Magnesia	1·38
Alumina	70
Sesquioxide of Iron	125
Alkalies	?
Insoluble residue	370
	99 506

1=89·682 Tribasic Phosphate of Lime
2= 7 131 Fluoride of Calcium.
3= 0·406 Chloride of Calcium
4= 0 840 Carbonate of Lime

Specimen from seventh range of Portland where exposed vein measured twenty feet across

Phosphoric Acid	41 139
Fluorine[2]	3 863
Chlorine	220
Carbonic Acid	2·43
Lime	49 98
Calcium	4 195
Magnesia	180
Alumina	·46
Sesquioxide of Iron	084
Alkalies	?
Insoluble residue	060
	99 854

1=89 814 Tribasic Phosphate of Lime
2= 7 929 Fluoride of Calcium
3= 0·358 Chloride of Calcium.
4= 0·507 Carbonate of Lime

THE GATINEAU VALLEY

(Route of the Ottawa and Gatineau Valley Railway)

Its Geographical & Topographical Features etc

The Gatineau Valley may be said to comprise the whole of the district from the range of hills eight miles east of the Ottawa River to the eastern boundary of the Lievre River a distance of say some 100 or 150 miles the northern boundary being placed at the watershed of the rivers running in a southerly direction about 150 miles from where the Gatineau empties itself into the Ottawa River. The country partakes of all the features peculiar to the Laurentide district. Five ranges of abrupt rocky hills run one above another their direction being generally east and west. As a rule however these ranges are very much broken especially near the river front. Tracts of plain country generally some miles in extent, are to be found in every direction on which the basins formed by the dips of the hills are clear lakes, teeming with fish and varying in size from the insignificant pond to the expanse of water 40 miles long by 30 broad. The hills are usually covered with choice succulent grass, which provides the finest possible grazing for sheep and cattle. The soil of the table lands and plains varies from a light sandy to a rich loam, from stiff clay to dark or black muck. Oats, barley rye and maize may be grown to advantage everywhere, while in the heavier soil wheat will always yield an abundant crop. As yet however the capabilities of the soil have not been thoroughly tested lumbering operations having heretofore occupied the whole attention of the settlers. Now however that the country has become almost denuded of pine farmers are rapidly clearing the land and the results, generally speaking may far exceed their expectations. The great drawback with the most of them is the distance from a market, rendering it almost impossible for them to dispose of their produce and stock.

The rocks consist of a series of metamorphic sedimentary strata and are the oldest known to geology. They are altered to a highly crystaline condition and are composed of feldspathic rocks interspersed with important masses of limestone and quartzite. They enclose a vast number of useful and interesting minerals, including galena apatite (phosphate of lime) plumbago, mica, asbestos, hornblende, garnet serpentine, tourmaline, kaolin, molybdenum, marbles etc., and also immense masses of iron sometimes magnetic, but more often titanic. The only remains of animal life known to exist in this series is the eryon though I believe that the large quantities of carbon found in the form of graphite also points to either animal or vegetable origin.

The townships which will all ones be benefitted by the projected railway are the following:—Aumond, Scotte, Manuwaki, Kensington, Egan, Lytton, Blake, Bouchette, Cameron, Wright, Northfield, Aylwin, Hincks, Lowe, Denholm, Masham, Wakefield and Hull. Of

the most northerly of these, very little is known. Pine of excellent quality is found there in great abundance, so that these four townships remain as yet in the hands of the lumbermen. Hard woods, such as maple, oak, birch and beech, attain a large size there, but is at present of no value, owing to the difficulties of transportation. The size and quality of the timber gives unmistakable proof of the richness of the soil beneath, and as the land is on the whole very flat, it will become of great value as soon as farmers settle upon it. At present the total number of the inhabitants of these townships does not exceed 300. Excellent specimens of phosphate of lime have been found there, and it is probable that large deposits of this mineral will be discovered when the verdure which at present hides the rocks is removed by the settlers. Good veins of merchantable asbestos have been reported, but did not come under my notice.

Following a southerly direction the next township reached is

MANIWAKI.

This township is destined to be one of the most important from an agricultural point of view in the whole Gatineau district. It has an acreage of 45,000 acres, of which 35,000 acres is tillable land of the greatest value, the soil being generally a rich black loam. Of the remaining 10,000 acres 8,000 would form excellent pasture for sheep. The land is level, is gently rolling as a whole, though somewhat broken to the south by steep ridges. Scarcely a fourth part of the township has been cleared as yet, a considerable portion of it having been retained by the Government as an Indian reserve. The uncleared portion is thickly covered with fine timber principally pine, cedar, oak and birch. Owing to the impossibility of conveying the heavier though more valuable kinds to a market by water, lumbermen have heretofore contented themselves with the best specimens of pine, cedar only. The hardwood yet remains, therefore, and will doubtless make a rich harvest for the lumber merchant as soon as he is furnished with the means of removing it.

THE VILLAGE OF DESERT

is already a place of some importance, and as the present terminus of the railway will probably soon swell into a town of considerable proportions. It is situated just at the confluence of the Rivers Desert and Gatineau, and is the principal trading post for the Indians and trappers north of this point. It already has streets properly laid out, hotels, stores, a Roman Catholic gothic church capable of seating 2,000 people, convent, etc. In the garden attached to the sacristy the Rev. Father Provost, the local Superior of the order of Christian Brothers, has succeeded in raising castor oil plants in such abundance as to enable him to manufacture oil from the seeds. The sorghum sugar cane has also been found to grow there to advantage. The Rev. Superior is a true lover of his country, as evidenced by his desire to develope all of her resources, and as much, showed the members of the survey every possible kindness, recognizing fully the greater importance to the district of the work in which they were engaged. The last census gives the number of families in the township as 650, including settled Indians. Geologically speaking, not named as officially known of Maniwaki. The rock is principally either a uroplyritic granite or primary limestone. A white

crystalline limestone—considered an almost infallible sign of the best agricultural land—was found in close proximity to small beds of apatite. Upon the third range near Messrs. Hamilton's farm, a good promising exhibit of argentiferous galena was noticed in a boulder fragment. The percentage of silver would I feel certain, enable this ore to be worked to good advantage provided a sufficiently large vein were discovered. Upon the second range iron sand has been found, the percentage of iron being very high. Hematite iron ore abounds in this and adjoining townships. Of

BLAKE, CAMERON AND HINCKS.

three of the townships on the east side of the Gatineau, I know very little, the rapid progress of the survey leaving a visit to them quite out of the question. From specimens procured for me by kind friends, I should say that Cameron and Blake will well repay the attention of mineralogists. An ore obtained from Thirty-one Mile Lake contains copper, with a percentage of silver, almost if not quite equal to the surface indications of the world-favoured Moose Horn mine of Colorado. Magnetic iron ore of the same quality as that worked to such advantage at Templeton is found there, and I have also seen good specimens of apatite brought from the same district. I am afraid I must disbelieve the many stories current amongst the country people regarding the discoveries of gold in these districts. If found at all it will probably be in very small quantities, too small in fact to pay mining expenses. Hincks according to a well known authority upon the subject, stands in phosphate of lime. The specimens I have seen tend to prove the statement, the quality being excellent and the quantity I am assured, unbounded. Galena of a very soft nature has been found there and would probably yield a good return if mined for lead only. Plumbago I found there in wonderfully large quantities and as soon as a separating process has been perfected will repay the cost of mining.

NORTHFIELD

and Denholm, on the same east side of the river, are also rich in mineral. The former which lies between Cameron and Hincks, has a population of 400, and is assessed for municipal purposes at $25,000. The great phosphate belt known to pass northward keeping the east side of the river from Templeton and Portland up, crops out in the most promising manner at Northfield. The surface indications can perhaps, scarcely be surpassed though not at once evident to the superficial observer. A limestone of a highly saccharoid texture has lately been discovered there which will probably yield a marble suitable for statuary and will certainly command a high price when brought to market. A most valuable iron ore exists in large quantities. The same remarks will apply exactly to

DENHOLM

the township to the south of Hincks. Phosphate and marble both promise well there. An ochre of good quality is found in a very large bed in Denholm and now that colouring earths are rising in value, bids fair to become a valuable property. Both townships contain good farming lands though Northfield seems to have the advantage in this respect. We may perhaps, give 25,000 acres as the extent of arable land in Northfield and 12,000 to 15,000 of that in Denholm. Generally

speaking both townships are hilly. Denholm especially so, the tillable land being found generally in the valleys. Both are well watered by lakes and streams and offer good inducements to the sportsman.

Returning to the west side of the river we have first to deal with

BOUCHETTE,

the township to the south of Maniwaki. It has an acreage of 45,000, of which perhaps 25,000 is arable land. To the north the land is very light and sandy, but improves as one proceeds southward. There is a great deal of quite level land, which would produce excellent roots and to the south cereals also. The hills are in some cases quite bare, having been denuded of soil by successive fires. We found many interesting pockets of phosphate of lime, containing perhaps from 50 to 150 tons of mineral apiece, and also whole mountains of iron ore. Graphite, I noticed, existed in some spots—perhaps in paying quantities on the Northfield farm. There is a good deal of birch in Bouchette, and as this is now one of the most valuable woods it will be rapidly disposed of as soon as the Gatineau Valley Railway has become a reality. The population is, say 450, the assessment being at present $40,000.

WRIGHT

is at present a most important township. It has an area of 48,000 acres, ¾ of this good arable land. The soil is a loam with occasional beds of clay. Several large farms have by the use of modern machinery been brought into an excellent state of cultivation, and will repay the care bestowed upon them. Wheat of a sample difficult to be surpassed is grown there, while roots attain the largest size. The population is about 1,000, consisting principally of farmers of the better class. The village of Victoria has already been properly laid out and has a Roman Catholic Church, Court House, agricultural exhibition buildings. Its inhabitants number upwards of 200. The Blue Sea Lake to the west of the township is rich in minerals. Colouring earths of various shades are found there in quantities. On lots 7 and 8 of the fourth range specimens of the most valuable phosphate have been found. Considerable deposits of the same substance were noticed in other parts of the same township. Copper has also been discovered in small quantities.

Along the banks of the Pickanock River are valuable knots of timber land, oak and ash being found there of the finest size and value. The assessment for municipal purposes, is $85,000.

AYLWIN

in its general features closely resembles Bouchette, so that I need not repeat myself here, but refer you to what was said of that township. It has several fine farms of large extent, all of which invariably yield rich yearly returns. The population is, say 800. Aylwin has been *par excellence* the pine producing district and now possesses but little merchantable lumber, bush fires having from time to time swept almost the whole township. Its minerals comprise phosphate in fair quantities, peroxide of iron, graphite, garnet and talc.

LOW

may be set down as an extensive township. It has a total area of 64,000 acres, of which little more than half is arable land. The soil

alternates between sand and blue clay. The crops raised are nevertheless fair, though the land cannot for long remain of any use under the rude system employed by the majority of the farmers. It has a large population, as compared with the other townships, but I am unable to give the figures. The hills are abrupt and rocky, though very little rock is found in the flat districts. To the south the country is very much broken by deep precipitous gulleys. The rock is principally protogine of an unpromising nature. Some small pockets of phosphate were noticed at the north end of the township. Narrow veins of asbestos were also discovered. Coloring earths of most pronounced colors were found on the fifth range. Its present assessment is $60,000.

MASHAM

is the farmers' township, the percentage of arable land being probably higher than that of any of the surrounding townships. The soil is principally a heavy loam, which raises the finest cereal and root crops. It has not much rock and very little valuable mineral at the front. To the west iron abounds, and small deposits of phosphate have been discovered. Gold in small quantities has been noticed by members of the geological survey. The township is well settled by a most energetic lot of well-to-do farmers. Of

WAKEFIELD AND HULL

it is quite unnecessary for me to say much. Both townships have for many years been well cleared and found to contain excellent farming lands. Geologically they are well known having been thoroughly explored by well known experts. Vast quantities of phosphate are found there and a number of mines are at present in operation. I must not close this report without reference to the class of horned cattle the country contains. The influence of the large depot farms has been felt in this direction the presence of thoroughbred animals of the Durham and Ayrshire breeds having had a most beneficial effect upon all the cattle consequently there is to be found there just the kind of stock the export trade requires—the broad deep, short-legged beeves which at once take the eye of the British butcher. Taking this fact in connection with the grazing facilities of the whole valley we cannot doubt but that in a short time a most lucrative trade will spring up, provided the means of rapid and easy transportation were at hand.

The farms of Alonzo Wright Esq. M.P. Hamilton Bros. Ross Bros. Hall & Co. Gilmours, Luke Hersey in Aylmer, and others, for extent, fertility and general condition are equal to any on this continent. The root and other crops in most years have been superior and have always been equal to those raised on the best lands in other portions of the Dominion of Canada.

As might have been expected from the nature of the country the Gatineau River and most of the streams running into it offer many most advantageous sites for mills and factories. As the number of timber shoots upon the main river and its larger tributaries testify we need go back but a very short distance to find natural falls, with a head of water capable of furnishing motive power to mills of the largest size.

THE AUX LIEVRES VALLEY

(Route of the Ottawa Colonization Railway)

GENERAL NOTES FROM LATE REPORTS OF THE CHIEF ENGINEER

Rich as the Gatineau Valley on the west side of the river undoubtedly is, there can be but little doubt of the superiority of the east side, from a mineralogical point of view. Of course, as before stated, the west side has not received the same general attention as has been given to the district between the Gatineau and Aux Lievres Rivers. Valuable deposits of apatite, galena, copper ores and kaolin have been discovered in certain localities along the route of the Gatineau Valley Railway, some of them quite recently. But on the east side, the section traversed by the survey of the Ottawa Colonization Railway has long been known to be *par excellence* the phosphate region of the American continent.

To show this more clearly, I refer you to the map of the County of Ottawa. If from a point to the north of Cameron township, a line be drawn in a direction due east to the limit of McGill and from this latter a southerly right line be extended to the county limit of Buckingham, the rectangle completed by the Gatineau and Ottawa Rivers, the rectangle will be found to contain some 600,000 acres. Then I am under the mark than otherwise when I assert that 200,000 acres of the enclosed district has been found upon actual exploration and examination to contain phosphate in large well paying quantities.

In other words, the two great belts of this mineral which may be traced from their point of convergence, near the gore of Templeton northwards to the extreme limits of the Laurentian area, cover nearly one-half of the circumscribed portion of Ottawa County.

This does not include all the apatite of the district. Crystalline deposits, varying in quantity from a few glittering crystals to the "pocket" containing thousands of tons, have been actually found in with few exceptions, every portion of every township not actually run over by either of the great bands. The trade in this mineral is in its infancy although at present the activity witnessed at the various mines in working is very great.

As a fertilizer it has to seek a market in older countries, hence shipments are now made to England, France, Germany and the United States, and the ultimate result of largely increased demand cannot be considered doubtful. Already English and French farmers, led on by the great superiority of phosphate to the compound termed "guano" and avidly sold, have arrived at beyond the experimenting point, and the demand appears to be even now very much greater than the supply.

As an illustration of personal experience I may state that in my position as Chief of the Scientific Commission in Mexico I was induced to study the action of phosphates on tobacco lands. I can demonstrate to those interested in agricultural pursuits that apatite is of

infinite more value as a fertilizer, cheaper and its effects more permanent or lasting.

In Ottawa County some companies are vigorously at work at the south end of the County, viz., in Templeton, Buckingham and Portland, and the richest and most important in working are known as,—the "Bonanza," in East Portland, the property of W. A. Allan, Esq.; the "High Rock," owned by Messrs. Pickford, McIntosh & Co., and the "Emerald," owned by Messrs. Murray and Allan. In connexion with the development of the phosphate mining of this County, the party have received much valuable information from Mr. W. A. Allan (now residing in Ottawa) who may be said to be the pioneer in phosphate in this country, and is probably more conversant with the various townships and their resources than any other gentleman, inasmuch as he has, for a period of eight years, employed his own experts in prospecting for minerals. Hence his experience and information is regarded of first importance, and of greatest value.

In spite of the drawback of being compelled to haul the mineral over several miles of country roads, and under every conceivable drawback this industry gave employment last winter to thousands of men and fully three hundred teams, and probably yielded its promoters rich returns.

Upon the opening of navigation a steamer for the purpose of towing barges on the Aux Lievres, was very successfully run by the proprietors of the "High Rock" Mines and some 20,000 to 25,000 tons mined and shipped during the season.

South-east of the County, that is, in the townships of Lochaber, Mulgrave, Derry and Buckingham are immense deposits of plumbago. The material is of superior quality, as is generally known. Some specimens obtained have been favorably compared with the products of the well known mine in Cumberland, England. Others of a softer less friable texture promise to be even more valuable from a commercial standpoint.

On the 4th and 5th Ranges of Buckingham and the 6th and 7th of Lochaber the plumbago hardens—if I may be allowed the expression—into a galena certainly argentiferous in many cases.

Near the famous "High Rock" Mine alluded to, some of the finest jasper perhaps ever brought to light in any country was observed. Jasper also abounds in Denholm, which likewise contains some heavy veins of phosphate, and both Hincks and Denholm are rich in asbestos, of a fibre in most cases longer than that of the "Thetford" Mine which mine furnished with railway communication is now being worked to much good purpose in the eastern townships. Both contain beds of marketable ochres and other colouring earths. Kaolin of the finest kind was observed in several townships fronting on the Gatineau.

Of McGill, Bigelow and Bowman I here say little, as these townships are now being explored and attention will be drawn to them in other reports; suffice it here to say that those with Denholm are the locale of the richest and richest belts of phosphate. These, with their forests of most valuable woods, gives them prominence perhaps, over all other townships in importance and value.

Ranges of white crystalline limestone rocks traverse the whole district from north to south, and in many instances will yield marbles of the finest texture and most brilliant shades, varying in colour from a decided red to a bright salmon colour, and from lilac to dark green

The nature of the rock is, of course, the best possible guarantee for the great value of the soil, from an agricultural point of view. The magnificent stretches of hardwood furnish another proof of this well founded theory.

Galena in payable quantities has been found in the townships further north, and copper pyrites in various localities.

Probably of the 600 000 acres roughly estimated as the superficies of the rectangle alluded to, 350 000 acres is arable land—thus added to the areas before mentioned in the report by the Rev. W. Percy Chambers, M.A., upon the Gatineau Valley.

REPORT

—ON—

APATITE-BEARING ROCKS

BY

MR WILLIAM STUART

In Ottawa County Quebec

COMPILED AND ARRANGED BY

A H McDOUGALL B A (Tor)

To C H. Mackintosh M I *President O & G V Ry*

Sir,—

In conformity with instructions, prospecting has been carried on steadily during the months of October, November and part of December. In carrying on work of this kind in a thinly settled country and especially late in the autumn many delays and difficulties were to be expected but we have been singularly well aided both by the open weather and by very many residents of the County who one and all appear to consider the interests of the Company identical with their own. In particular we are indebted to the intelligence and perseverance of our guide Mr Charles Bigelow an old and respected resident of Buckingham Township, and well acquainted with the geography of the whole region.

We have endeavoured to arrange the field notes taken in systematic order by keeping those belonging to the different townships separate and by giving the descriptions of the lands in the different ranges in their order from south to north. Where shown on different lots or ranges to seem to belong to the same apatite belt, such connection is mentioned incidentally in the narrative.

TOWNSHIP OF BOWMAN

Range VII.—On lots 2 and 3 there are some well-defined shows of green bright-blue crystalline apatite. The veins in most cases run due north and in some places the width of the vein of pure apatite is three feet. Due north-east from this apatite is found showing up in four places. The gangue rock is mostly feldspathic, with some little quartzose gneiss and very little mica.

In crossing lots 4, 5 and 6 apatite is seen to crop out here and there all along until lot 7 is reached where there are two well-defined veins the gangue-rock being quartzose gneiss interlarded with orthoclase and pyroxene. Next lot 8, orthoclase and pyroxene continuing

apatite was struck in eight places, in one place there being a well-defined lead running south. Here there are two small lakes on top of the mountains, all around which apatite can be found.

There is a belt of apatite-bearing rocks running across the west ends of the lots from lot 9 to lot 18. About lot 13, and extending for a distance of about two lots in a heavy belt of crystalline limestone, underlining feldspathic gneiss, small seams of apatite were found, together with bands of pyroxene and mica through the rocks. The rocks on the east ends of these lots (9 to 18) are all apparently apatite-bearing, and that mineral was found there in five or six places.

Near the centre of lots 18 and 19, there is what is known as the "McKenzie Mine." This was very closely examined. On a belt of rock bearing north-east from the mine for one-fourth of a mile, and about fifty or sixty feet high, the mineral apatite shows right up to the top in two distinct places very strong, and in a well-defined shape, the veins appearing to bear north east, and dipping at an angle of about 80°. There have been some tons of phosphate taken from this place, but the mine has been left in very poor shape. The gage-rock is feldspathic gneiss, with some pyroxene, mica, and very pure calc spar. The apatite is a rich green, say from 85 to 88 per cent. highly crystalline but as depth is attained becoming more granular. These lots are apparently of very great value and should not be disposed of in their present shape because the "show" could, at small expense, be opened out so as to exhibit very heavily.

A mountain about two hundred feet high runs north west on the west ends of lots 20, 21 and 22. Apatite shows on this mountain in ten distinct places, beginning at about fifty feet from the bottom and extending right to the top. The apatite is highly crystalline, with rather lightly colored pyroxene and mica. gage rock is very close-grained feldspathic gneiss. Some one has been here and fired some shots, but they have not worked in the best place. Half of these lots is fine land, bearing good timber.

Following north along west ends of lots as far as lot 32, there is good land level enough for farming purposes, and bearing fine timber.

Apatite was found on lot 34 near the edge of White Fish Lake, and if this lot were prospected more closely, the mineral would probably be found in larger quantities. From lot 50 to lot 58 the rocks appear to be very rich in apatite, but a close inspection of these lots was not made.

RANGE VI.—On lot 4 there is a well-defined show. On lot 5, said to be owned by Mr Robertson of Ottawa, there are two good shows. On west end of lot 6 there is another very good show. Part of each of these three lots is good land, bearing fine cedar. Here and there along the top of mountain from lot 6 to lot 16 the rocks are partly mixed with apatite; on the top the sediment is so deep that we were unable to get at the solid mineral, but it appears to drop down through here to Range V., and the feldspathic and quartzose gneiss so rich—apatite appearing here and there all through. On these lots there is a belt of rock running north-east for about one mile, the average height being about two hundred feet, all quartzose gneiss, interlaced in some cases with orthoclase and specks of apatite. In lots 15, 16 and 17 there is some fine flat farming land, covered with large quantities of good pine and cedar. From lot 18 to lot 24 apatite was not found in paying quantities, but the rocks on 19, 20 and 21

give such indications that there cannot be but heavy phosphate, considering the good shows. On these lots there are large quantities of good black oak, and on top of mountains, untouched by lumbermen, some fine pine, also some good farming land. There is apatite on lots 24, 25 and 26; on lot 25 in three distinct places. On west ends of lots 23, 24 and 25, apatite was found with pyroxene and mica on a belt of rocks bearing nearly east and west, with an average height of about twenty feet. The gage-rock in some cases flesh colored spar. The apatite can be seen in many places (four of these being very strong shows) together with the load-wall, it dips at about 33 north-east. In the centre of these lots apatite was found in eight places, the wall-rock being very rich micaceous gneiss; but on account of the depth of the sediment, the extent of the apatite bearing rocks was not ascertained. There the gage-rock appears to dip or shift into quartzose gneiss, the apatite slightly mixed alongside of pyroxene and mica; forming what is, without doubt, a very good formation. The land of about half of these lots is good and bears plenty of pine, cedar and tamarac.

The apatite appears to cross the south halves of Ranges V VI and VII. in three distinct belts—

(1) It strikes first from lot 5 on Range VII to lot 4 on Range VI.

(2) The next strong place is lots 13 or 14, Range VI., and from that it steps down to Range V., making strong for Seaher Lake.

(3) Then from Range VII lots 18, 19, 20 and 21, it steps down in direction east north-east on Range VI lots 23, 24 and 25, still keeping down through Range V at back of Lake Rouge.

From lot 25 to lot 30 the average half of each lot is good land. From lot 30 to Provision Lake the land is partly rough with some very good timber the rocks, mostly feldspathic and quartzose gneiss with beds of pyroxene and mica, showing out here and there. From Provision Lake to lot 58 the apatite steps down stronger and near the north end of Sunloehs Lake it appears to crop out strong and heavy, and in continuous veins of uniform width of 5 feet.

Range V.—On lots 6 and 7 running in to Seaher Lake, apatite was found with crystalline limestone running for thirty feet east, and down into the lake. The rocks across the lots from 7 to 13 are rich in apatite, and some fine mines will be struck here. There are some lots between 7 and 13 supposed to be owned by private individuals,—and openings have been made. But we were unable to ascertain the exact numbers of the lots, but we believe it to be all Government land. From lot 13 to lot 22 apatite will be found in many places showing up strong and in good shape. There are some very heavy deposits on lots 20, 21 and 22. The next grand stand the apatite makes is on lots 25, 26 and 27 and thence extending to Croche Lake. Around here the gneiss rock appears twisted and contorted in many ways and in some places somewhat discolored approaching to rust. Heavy deposits of apatite lie around or near here. From Croche Lake to the end of the township on this range the land is level, good for farming purposes and heavily covered with timber—the soil generally extremely rich.

Range IV.—On this range the formation is such that phosphate cannot be found in paying quantities up as far as lot 50 except that judging from the run of the apatite in Range V something might be expected between lots 29 and 38 on the west ends of the lots. From 50 to 55 is a continuation of the fertile valley loam bed in Range V

RANGE III.—The first part of Ranges III. and II. is very rough and mountainous; mostly hard and tight feldspathic gneiss, with no signs of apatite; all the timber burnt, except about two lots of hardwood. The gneiss appears discolored and very dry, with some little crystalline limestone, partly mixed in some places with pear and sulphur-colored mica—against apatite at all times.

From lot 48 to lot 58 is a continuation of the above-mentioned fertile valley, low hills bordering it rich in the mineral.

RANGE II.—Apatite was found in many places on lots 51 to 58. All the gneiss rock around here is micaceous gneiss, intersected here and there with heavy beds or bands of pyroxene, mica and highly heated hornblende, mixed with fine samples of very highly crystalline tremolite, the first of this mineral we have seen in this township. In some places iron pyrites can be seen; also the first we have seen in this township; and some signs of the mineral sphene. These lots will turn out well, as the minerals are very dark colored, have been highly heated, and the slopes of the ranges are fibrous. There has been a great commotion here and in three places stands have been made by the conflicting mineral elements.

RANGE I.—Owing to the infiltration made by the minerals in Range II. some of the apatite-bearing rock has jutted out into the back parts of lots 51 to 57 of Range I.; in some places it may be found strong but it does not appear to crop out near the river.

This township is well timbered for allowing the mineral from the mines, many level plains intersecting it good roads could be easily made, and in some cases bush roads already exist.

The land in this township is of a very good quality for farming purposes, with the exception of the strip along the river which is very poor, being somewhat light and sandy.

TOWNSHIP OF BIGELOW

RANGE I.—Lots 1 to 6 inclusive, of this range belong to Ross Brothers. On lots 7, 8 and 9 there is a bluff of rocks about one hundred feet in height and nearly perpendicular. Here and there along this bluff of micaceous and feldspathic gneiss, for one hundred and fifty or two hundred yards, we found apatite with mica, pyroxene and crystalline pyroxene. In some places this rock is quartzose gneiss, mixed with pyroxene and mica. These rocks are rich in apatite and the lots are covered with fine hardwood and a very good quality of pinewood. This phosphate belt strikes west to Range II. and through to Bowman.

RANGE II.—We struck apatite mixed with pyroxene, mica and spar in six or seven places along a ridge running through lot 1. The gneiss rock is mostly feldspathic, mixed with some very good micaceous gneiss. Good hardwood land all around here, pine mostly all cut.

On lot 16, about 300 yards from the river, there is a small mountain say fifty feet in height extending westward much discolored with rust. In the east end of it there is a very good lead of apatite running east and west, down side of mountain. In some places where the earth has been swept land off the apatite can be well seen and is strong and on south-east side of the mountain and low down near the level land, underneath as it were, this rusty feldspathic gneiss, bands of calc spar and crystalline limestone bearing east and west, a visible. A strong show could probably be found here although some of the

mica has rather a silvery appearance. Further west is all apatite-bearing rocks, until the back of the rock is reached; these lots are undoubted veins.

Lots 27 and 28 are just below the rapids on the Aux Lievres, and we have a water power of magnitude. On the opposite side in the township of Wells, the foot of the rapids is closed in by a high range of hills.

Lots 22 and 23 afford the best facilities for landings and sites, there being a trail from them out to the Government road.

Lots 29 and 30, Range II, together with lots 29 and 30, Range I, in the township of Wells, embrace the rapid "De Creche." The fall here is about twelve or fifteen feet, affording another very valuable water power.

Lots 44 and 45, Range III, together with lots 44 and 45, Range A of Wells, contain the Iroquois Rapids, which extend for about two hundred and fifty yards along the river with a fall of about twelve feet. There are numerous water powers of lesser magnitude. Hardwood in abundance.

RANGE III.—We struck apatite in rather a fair shape on lot 14. Keeping west and south-west to White Fish Lake the rocks are all apatite-bearing but the sediment is deep and only in places can the rock be seen. Explorations will undoubtedly pay here. From lot 1 to lot 12 the land is level, good for farming, and has very fine timber.

With reference to Ranges II and III from lot 2 to 30, between Lac-au-Sable and the river, on lot 24 Range II a view of calc spar was found a little discolored, highly crystalline and pure. The vein is about one foot wide with the gangue matter of same substance on head wall side, heavily mixed with mica of a very dark and sooty appearance. This vein or lead runs due east and dips about north east, say 30°, and can be traced many hundreds of feet down to the lake and out to the river. These calc spar veins are important at all times as lands far many minerals so from such indications as these, we struck south-west. Near the centre of lots 25 and 26, Ranges II and III, ridges of feldspathic and quartzose gneiss bear mostly due east and west in a well defined shape, about twenty to twenty-five feet in width. The south side of each ridge a vertical from four to six feet and straight for hundreds of feet in some cases, with, at intervals square heads dipping west at about 80°, showing all at the drift or current from east to west, was sharp and fair underground leaving little or no chance for one to get at the apatite, although the rocks have an apatite-bearing appearance. Getting back into the west ends of lots on Range III we struck due north across lots to 30 finding only pockets of apatite the rocks continuing much the same. The current has here at a greater depth than any which has been yet observed in the Ottawa locality and until by means of diamond drills, series of holes have been put down to from six hundred to two thousand feet to see or reach the dead rock anything more said by me at this time about this subject, will appear as idle speculation. But until such times as the dead rock is reached we make bold to say that far below any of the depths mentioned here apatite will and can be found, and further state that until such depths have been gone down to, by some party or parties running for apatite will not begin to pay the holders of these claims. This current must have carried along the calc spar and pyroxene (as no signs of them could be found on the surface) until some strong wall of gneiss

or trap has forced them up. Here is an only chance of finding the minerals mentioned.

Ascending lot 41, Range III. up mountain which is part of a high ridge (say three hundred feet above lake), after getting up and over the top, we struck west above lake as far as west end of lot 39, Range IV. then north-east as far as lots 45 in Ranges III and IV. then south to river, finding only shows of apatite. This ridge is too tight, solid and dry for any chance of finding apatite in large quantities or bedded veins.

Finally in the Township of Bigelow, we recommend that Ranges III and IV be further explored from lot 45 to lot 54, and Range V from lot 38 to lot 54, no part of which has been travelled minutely, but on which we believe phosphate can be found in good quantity, the indications being good.

TOWNSHIP OF WELLS.

We next prospected from lot 8, Range II., up the west side of River des Ours, to lot 13, and from 13 crossed over to 18. Near the centre of lots 15 and 16, Range III., the apatite crops out strong in over twenty places, there being some magnificent shows of well-defined veins. The gangue rock is feldspathic gneiss, very much discoloured with rust partly oxide of iron and magnesia, but as depth is reached the rust will disappear from the apatite. The apatite here is of a bright blue color, highly crystalline and very fine (say 88 per cent.) The ridge or belt of rocks is very high, much contorted, twisted and broken up; there appears to have been some volcanic upheavals here. We went over this place very carefully and are able to state that this belt of apatite ends across River des Ours from lots 17 and 18 on Range IV. very faint. We carefully looked up and down bed of the river as the water was very low; bottom rock micaceous gneiss, fine-grained rather hard dipping about north at about 35°. Above gneiss in bed of river there is crystalline limestone in heavy beds for about one-quarter mile north west, the mountain rising very abruptly. Here quartzose gneiss in bands dipping partly north, say fifty feet high and here and there heavy beds or bands of pyroxene and mica mixed. Then for one half mile west the gneiss begins to show rust and feldspathic and the apatite creps out well and as we have said before strong and in grand shape down into a small lake, and still going west for half a mile above the gneiss is black from great heat and is mixed with granular coarse and massive tremolite, horn blend and we think some sphene. This brings us down to Range II. In many places rocks partly phosphate were found along top of mountain. In one place there is a loose stone—say ten tons in weight—partly quartzose gneiss which in angular to say does not appear to belong to this formation. From here the apatite appears to dip and strike right across the river to Bigelow lots 7, 8 and 9, Range I. On lots 8 and 9, Range II of Wells, there is not much of any apatite but fronting, as they do the two rivers, we consider they must become valuable for hauling and wharfage. Some of these apatite-bearing rocks were first found by Mr. Lemon.

There is a series of rapids on the Des Ours River extending for about three hundred yards through the lots recommended the total fall being probably about sixteen feet. This would give a first-class water power in fact at one point a head of ten feet could be very

easily maintained the whole year. All kinds of hardwood abound. At the north-east and south-east sides of two of Mr. James MacCabe's lots we partly overhauled two very large apatite-bearing mountains, and dug up ten or fifteen pounds of that mineral. The gage-rock all around here is feldspathic gneiss, with heavy beds or bands of pyroxene, and half mica and apatite mixed, showing out in every conceivable shape on surface, and much charged with rust. We may say that what we saw here, if properly worked, will be found to be a mine of wealth, and will satisfy any reasonable mining operator.

To conclude, this township, as far as our information goes, we believe that phosphate may be found crossing from lots 16, 17 and 18, Range I. of this township into Bigelow, and that it can be seen near the bank of the river Aux Lievres, but we are unable to give definite information. The eastern side of this township should be further explored and thoroughly, and if apatite is found there in paying quantities, the explorations should then be pushed still further eastward, to find, if possible, the whole length of this belt.

As far as we have seen in Wells up to lot 26 the land is only fair for farming purposes, but above that it becomes heavier and more fertile as we near the end of the township.

General notes on the Apatite-bearing Belts and Rocks in the Ottawa Region

From a running point what we term a belt, a current which must have travelled from east to west, and in so doing, where heavy walls or dikes of gneiss were met with the apatite made for the surface in conjunction with other minerals not till a clearance had been effected. These surface shews are the mines of the present day. In some cases the mineral took a due sports off the belt both north and south until the clearance above mentioned was effected.

In travelling through Bowman from west to east, these belts are found to strike strongly from Range VII. to Denholm in the following places. From lots 2 and 3, from lots 7 and 8, from lots 18, 19, 20 and 21. There is also a belt striking across from lots 24 and 25 and farther north-east in Range VII. up to White Fish Lake, the land being nearly level, and in the line of the belt, the mineral must have dipped below, and our explorations tend to prove this theory.

Again from lots A and B, Range V. of Bowman down through Range IV. to the High Falls some very strange and peculiar upheavals may be noted. This belt here appears to have been pushed or punched south close down to bottom of the falls in Portland West. Over the river in west end of Villeneuve there are no signs of apatite for three miles back, all the rocks have suffered much from low and flickened from great heat and partly rust coloured, and in some cases the gneiss is partly mica of a sooty appearance. No apatite could have been formed here near the surface. We recommend that the east end of Villeneuve be again explored by parties and if large deposits of apatite are found these leads or belts should be followed up both east and west until the whole township has been traversed. We are not at present able to make any safe statements regarding the resources of this township, neither as to the number of the belts nor what they

extent may be. Judging from present knowledge, the apatite-bearing belts of great depth and richness (if fairly put to test) lie between the Gatineau and Aux Lievres rivers from Buckingham, Templeton and Hull, up to front of White Fish Lake. A little below White Fish Lake this apatite-bearing formation widens out both east and west and will be found to strike strong from Lake des Ours west to the Gatineau. These statements are founded on reliable information, and we regret that we have not been enabled, for want of time, to put them to a real test this fall, however, a party should be sent out in the spring to extend the amount of information already obtained.

In conclusion we would say that mining capitalists should procure diamond drills and start a series of borings in the various townships and at different angles, so as to arrive at as it were the average thickness as well as the depth of the veins of these great phosphate belts in Ottawa County. This is necessary in such an enterprising and progressive age as the present, if we wish to fully develop this branch of industry and obtain good returns for the amounts of capital invested.

In the methods of mining great improvements can yet be made. The antiquated methods should be laid aside and steam drills, batteries, and compressed air when required should be brought into use. One steam drill will, in good hands, in an open pit, do the work of fully eighteen men, and in a drift much more.

We are of opinion that little profit will accrue to the individual enterprise. There are thousands of lots upon which phosphate exists, but the great mines are few and can only be successfully worked by companies having approved and modern appliances, including, for development with certain results, the diamond drills, &c., before mentioned. Above Wells, Bigelow and McGill we know little, but we are inclined to the opinion that Denholm and the country north of the townships above mentioned will prove of great interest, the indications noticed by some of our party and the reports current, tend to mark that region even more prominently as the phosphate region *par excellence*, but it is more than likely that the mineral will be found at greater depth and with generally less mountainous and ordinary surface indication. In resuming these explorations next year the townships of Denholm, Bouchette, Cameron and Blake northward should be taken up, and for the reasons hereinbefore outlined.

Before concluding we would impress upon you the importance and value of the timber in the district visited, comprising maples, cedar, tamarac, oaks, hemlock, beech, birch, basswood and the usual pines. In the area traversed at least 2 or 3 million ties for railway purposes may be had, and the other timbers for trestling, culverting, &c., &c., is there likewise in great quantity. The hemlock and oak bark alone would in themselves create a large and profitable business. The lakes visited are teeming with fish, and mink, muskrat, beaver, marten and large and small game appear to be plentiful.

OTTAWA CITY AND JAMES' BAY.

The Ottawa and Gatineau Valley Railroad Company, in addition to the early construction of their main line, have in contemplation the prosecution of an extensive exploratory survey from the Desert River, the present terminus of the road, to James' Bay, the distance from Ottawa to the Bay by the Hartigan-aw River route being about 450 miles, and acknowledged to be not only the most direct but easiest of construction, whilst traversing a line of country full of valuable minerals of a highly marketable character, and offering an inviting field for the capitalist and farmer, second to none on the continent.

Not many years since the great North-western prairies, now the marvel of the world for their wonderful fertility and extraordinary production of grain, were a *terra incognita* to the general public, and were given up in the popular imagination to howling desolation and perpetual frost. The opinion entertained of them is very generally held to-day regarding the large yet more southern region comprising 60,000 square miles, situated between James Bay and the Height of Land north of Lakes Superior and Huron. Yet the constantly accumulating facts are likely to prove that this northern heritage of Ontario is exceedingly valuable in lumbering and mining resources, and capable of sustaining a very considerable agricultural population. The recent geological surveys demonstrate that almost within the mineral region lies without and beyond it, that the dense forests which cover it contain a very large amount of valuable timber which can easily be floated down the magnificent rivers—several of them each over 300 miles in length—which traverse the region, that the surface, unlike that of the Ottawa, Muskoka and Algoma districts, is almost unbroken by lakes, and only at seasonally by rocks, and that south and south-west of James Bay, to some distance inland, a fertile belt well adapted for agriculture exists, which, when the mineral and forest wealth of the country is being turned to account, will be an inviting field for the farmer.

EXTENSIVE IRON MINES.

It is exceedingly gratifying to learn from Prof. Bell's recently published report that around James Bay and up to the eastern side of Hudson Bay, the great deposits of iron and coal so close together that with the cheap water-fuel to which the region may afford the district along James' Bay may yet become another Pennsylvania. Prof. Bell, after referring to the soil, climate and forests of the district, says: "Minerals must in future become the greatest of the resources of the shores of Hudson Bay. Little direct search has yet been made for the valuable minerals of these regions. In 1875 I found a large deposit of rich ironstone on the Mattagami River. In 1877 no exhaustive examples of good manganiferous iron ore were discovered on the islands near the East Main coast (that is the coast along the eastern shore of James and Hudson Bays) and promising quartz veins of galena around Red Rock Calf and also near Whale River. Traces of gold, silver, molybdenum and copper were likewise noted on the

East Main coast. Lignite was met with on the Mistassini (a branch of the Moose), gypsum on the Moose, and petroleum bearing limestone on the Abittibi River (another tributary of the Moose). Another explorer, referring to the great iron, coal and other minerals of the neighborhood of James' Bay, says: "I have no hesitation in pronouncing this district the richest mineral region in the Dominion—perhaps on the continent." Anthracite and iron are found along the rivers south of James' Bay, a gigantic outcropping, containing over 25 per cent. of pure iron ore, displaying itself along the Moose, and a magnetic island on the Abittibi, rendering the surveyor's compass useless. To Ontario this immense mineral wealth is likely to yet prove an important factor in her prosperity, particularly as Moose Fort is only 500 miles from Toronto, and on the completion of the connecting link the Calendar, near Lake Nipissing, a Moose Factory Branch over 300 miles long, from near Nipissing, or a Branch only 200 miles long from near Nepigon will will the Pacific Railway furnish a short route to the shores of James' Bay.

THE GREAT NORTHERN FOREST.

The great forest which bounds Hudson Bay on the east and extends up the interior of East Main and Labrador to Ungava Bay and Hudson's Straits six hundred miles north of Moose Factory attains its greatest characteristic development just south of James' Bay, which lies nearly midway between the northern and southern limits of the peculiar trees which compose the great northern woods. Some trees, such as the Banksian pine and the spruces which along their southern limits in Central Ontario are almost valueless, commercially have become giants of the forest and are valuable for timber. The list of trees which flourish at James' Bay or in its drainage basin is long, and, according to Prof. Bell, the spruce (two feet or more in diameter), the tamarac, balsam poplar (luxurian), Banksian pine, silver fir, arbor vitæ, elm, white pine and red pine and of lesser importance the poplar, mountain ash and mountain maple. As James' Bay is as near to Liverpool as is Quebec, the future of this district as a lumbering country looks hopeful.

WARMER THAN NORTH WEST WHEAT LAND.

Such being the great wealth of mine and forest which is likely to be developed some day, the question arises,—are climate conditions sufficiently favorable for the agriculture which will be necessary to sustain the large population which may flock to James' Bay territory? Prof. Bell, who has spent thirteen summers around Hudson Bay, thinks they are. Testimony comes from other reliable sources to similar effect, casual experiments in wheat-growing have succeeded at so many localities. Moose Factory, at the extreme north of the Moose drainage basin, is in latitude 51° 16', the same as the Qu'Appelle Valley and further south than Battleford. Its winters are not colder than those of Manitoba generally, and are warmer than the Athabaska and Peace River countries. The average temperature for the year (38° 8') is 1° higher than that of many parts of the best wheat growing lands of the North West, and less than four degrees colder than that of Winnipeg—a difference chiefly perceptible in early spring. The southern part of the James' Bay district is further north than Manitoba, and on the same latitude as districts in Quebec, where wheat and even Indian corn are grown every year. The fertile belt of the district is a gently undulating plain, with a sandy loam soil, and lies in the same latitude as Winnipeg

If wheat in Manitoba is an assured success every year, it is reasonable to suppose that James' Bay district, with its large area of fertile soil, cannot be without agricultural value.

The scantiness of the population has prevented agriculture being tried. Fortunately at one point—Moose Fort—but on a "low, wet, clayey soil, exposed to icy winds," a careful record has been kept for several years, and it furnishes a test of climate much superior to that which casual experiments in agriculture would afford. The figures and comparisons given hereafter are chiefly compiled from the three latest meteorological reports, and embrace the years 1878-79-80, a sufficiently long period to exclude the possibility of much mistake regarding the general characteristics of the climate.

WINTER AT ST. JAMES' BAY.

The winter usually begins in the early part of November, but sometimes not until the third week. November and December are snowy months, but after New Year's, excepting in one year when January was snowy, the snowfall has not exceeded a few inches. The total snowfall is much the same as Toronto's, although a greater depth is on the ground at one time. Rain is rare in midwinter although not unknown. The mean temperature of December, January and February is 0·1 while that of Winnipeg is 1·3, or little more than two degrees warmer. The mean of Dunvegan in the celebrated Peace River country is 7·5 below zero, or nearly eight degrees colder than Moose Factory. In extreme temperatures Moose Factory is not so cold as Winnipeg, the lowest being 45 below zero while Winnipeg shows 46 below. Dunvegan registered 63 below zero in 1880. As excessive temperatures as Moose Fort knows, are recorded in the older settled parts of Ontario.

THE NORTH WINDS OF SPRING.

In March occasional temperatures of 45° to 50° above zero indicate the approach of spring. In the early part of April the ground becomes bare, but the weather is exceedingly disagreeable and variable until near the middle of May, cold winds and warm winds rapidly alternating. This is due to the fact that James Bay being exceedingly shallow, except in the deep central portion, freezes almost over its whole width—150 miles—and northward to its junction with the deep open waters of Hudson Bay, presenting in this respect an analogy to the north end of the Caspian Sea. The ice in spring remains and melts in the bay, and the cold air resulting from it is drawn southward in the greater part of the Moose River basin. North winds are thus the prevalent winds during April, May and June. In this respect the immediate neighbourhood of the bay resembles Cape Breton and several other parts of the Maritime Provinces where spring is retarded to an almost similar degree by the cold winds from the icy current flowing down the coasts. In May Moose Factory is 4 degrees cooler than Prince Albert or Landing, but inland, where the cold north winds have lost their force, the month, like the rest of the spring, is warmer. Gardening at the Fort begins about the middle of May and the last severe night frosts occur before the month is over, and temperatures of early 80° in the shade are sometimes reached.

WARMER SUMMER THAN EDINBURGH.

Summer may be said to begin with June, although the freezing point is touched about the beginning of this month in most years, as it is in the North-West, and in several parts of Ontario not far from Toronto. The summers at the Fort are not so warm as fifty and a hundred miles inland, and are cooler in June, July and August than at Winnipeg, and in many parts of the North West, but warmer than at other North-Western district, or at Edinburgh, Scotland.

The following table shows the mean temperature at various places, and will prove interesting for comparisons. The foreign stations are from Blodgett; all the Canadian stations, excepting Edmonton and North Saskatchewan show the means not in one year but in three—1878-79-80—and may be taken to represent the usual summer climate.

	JUNE.	JULY	AUGUST	MEAN.
	DEG.	DEG.	DEG.	DEG.
Moose Fort	54 0	62 0	56 5	58 2
San Francisco	53 8	57 0	62 2	59 0
Edinburgh	56 0	58 7	56 5	57 2
London England	58 7	62 4	62 1	61 1
Wick Scotland				54 1
Truro, N S	57 4	62 9	62 5	60 8
Prince Arthur's Landing	56 4	64 8	63 1	61 4
Bantrees Muskoka	59 0	65 7	61 8	63 5
Winnipeg	63 9	67 5	63 9	65 1
Edmonton			54 4	
Fort Saskatchewan			56 8	
Toronto	63 3	69 4	66 3	67 5
Windsor	67 5	75 7	71 0	70 7

THE LIMIT OF PROFITABLE WHEAT FARMING

Wheat requires for its ripening in Scotland a mean temperature for three months of at least 55 degrees, and in the interior of continents a temperature a few degrees higher so as to counterbalance the effects of the chill or frosts occasionally experienced inland. It would therefore appear that although wheat would easily ripen and produce a good crop some years at Moose Fort the mean temperature of the place might render it a rather precarious and not very profitable crop. Moose Factory however surrounded by a low wet, cold clayey soil, and exposed as well to the cold winds from the Bay. Beyond doubt the inlands valleys with their warmer soil have a temperature in many localities as favourable for wheat growing as in some parts of England and Scotland where it is a staple crop.

OATS AND BARLEY REMAIN CROPS.

The average temperature required for wheat is at least five degrees greater than is required for barley and oats. These crops succeed far up the Mackenzie river beyond the Arctic circle in Norway and in the northern counties of Scotland, where the summer mean is only 52 to 54 and the month of June is sometimes as low as 48 or 49 lower

tion at Moose Factory. Oats appear to be as resistant to frost as wheat and it can be shown that the climate of Moose Factory compares well in exemption from frosts with localities where oats succeed well, the general high temperature of the summer months will guarantee the full success of the oat and barley crops in the James Bay region wherever a proper style of farming is pursued.

CONTINUOUS EXEMPTION FROM FROST.

Taking the average dates of the occurrence of the last temperature of 32 in spring and the first fall to the freezing point in the close of summer we find the following to be the average periods of continuous exemption from black frost for the three years 1878-80 —

	Last 32 deg	First 32 deg	Continuous Exemption
Moose Fort	June 6	Sept. 26.	112 days.
Winnipeg	May 14	Sept. 15	120 "
Prince Arthur's Landing	June 2	Sept. 13	101 "
Beatrice Ont	June 6	Sept. "	93 "
Pembroke, Ont	May 15	Sept. 28.	136 "
Hamilton Ont	Apr 17	Oct 20	186 "

From this it will be seen that Hamilton and Pembroke far excel Winnipeg in exemption from damaging frosts, yet the exemption at the Prairie Capital allows of the growth of not only oats barley and wheat but of even of Indian corn. Beatrice Muskoka, grows with profit all the grain excepting corn yet it has a continuous period of exemption from frost nineteen days shorter than Moose Factory. Even Winnipeg exceeds the Fort only eight days. It is interesting to note that the celebrated grain district around Woodstock Ontario experienced a temperature lower than 32 on June 6th 1878 and June 7th 1879 or quite as late as the average date at Moose Factory. It will be noted too, while owing to the neighborhood of melting ice and cold water at James Bay the last frost of spring is later than at Winnipeg or the Ottawa region it is no later than in Muskoka while the first black frost of autumn occurs on the cold wet clayey soil of Moose Factory not till the end of September seventeen days later than in Muskoka and eleven days later than at Winnipeg. The long frostless period at Pembroke compared with the shorter season further south suggests that on warm soils inland from James Bay the frostless season may be even longer than at Moose Factory.

When the lowest temperature of the summer months are compared the result is equally favourably to James Bay. Thus while the average of west reached between the 1st of June and 1st of October at Moose Factory is only 29. 2 or less than three degrees below the freezing point, Beatrice Muskoka shows 28 in June and 27 in September. In July and August the average coolest is 40 or quite as high as in many parts of Ontario and higher than in most parts of the North West. The absolutely lowest reached in the same months in the three years was 21 at Moose Factory while Truro, N. S., Muskoka, France

Arthur's Landing, Fort Calgary, Dunvegan, and Edmonton, all were decidedly lower. In Muskoka and at Edmonton black frost occurred in August, and at Fort Calgary every month during the season 1880. Moose Fort had no frost any year before the middle of September. In the central countries of England last August 32° F. was reached in districts where wheat is a staple crop, while in the north of Scotland late frosts are sometimes known in midsummer, though oats and barley are grown extensively. The facts stated prove that for at least oats and barley the climate of even the northern part of the vast Moose River basin is admirably suitable, and they indicate that even wheat cultivation may be found practicable on warmer soils inland.

Hot waves are as frequent and almost as intense as at Toronto. The average highest in May is 75°, in July 88°, in October 74°. The average highest in Toronto in July is only 91°, and in October is 68°, or five degrees less than James' Bay. Evidently our supposed hyperborean has occasion to know the value of heat.

If the cold waters of James Bay retard the Moose Factory spring they make compensation by materially protecting the coast from the cold northern blasts, and by prolonging the genial fall weather. In fact the shores of the Bay enjoy

A MILDER CLIMATE THAN MANITOBA

of any part of the North West except Fort McLeod. The first slight hoar-frost at Moose Factory occurs not till about the 5th of September, and the first general frost not till the end of the month or quite as late as in most parts of Ontario. In October the days are genial and occasionally decidedly warm, and the night frosts at the end of the month not so severe as at Winnipeg. The beginning of November is usually mild, but as the month wears on towards the middle, winter sets in with snows, sometimes heavy, and the thermometer dips towards zero. Before the month is over the river is generally frozen, and the winter which is much lighter than in Toronto, fully sets in.

High temperatures in the fall months are not uncommon. The average max mum for October is higher than at Toronto, and in 1879 was actually up to 81°.8, or higher than has been known in Toronto October in forty years.

The following table shows the mean temperature of autumn —

		Sept.	Oct	Nov
		DEG	DEG	DEG
Moose Fort	3 years	58 3	41 3	31 8
Winnipeg	3 "	59 8	38 9	21 8
Battleford	2	46 9	33 2	19 8
Fort Macleod	3	54 6	40 5	27 2
Fort Calgary	1880	4[illegible] 3	36 1	
Fort Edmonton	1880	58 4	41 2	20 5
Dunvegan	1880	46 6	30 2	19 0
Toronto	3 years	59 1	49 7	34 1
Windsor	3	62 0	53 6	36 0

The figures presented furnish unequivocal testimony to the suitability of the climate of much of the James' Bay district for barley, oats, and various other staple crops.

If casual experiments at some points have failed, the cause may be found in ignorance or carelessness in conducting them. Of several hundred farmers at Edmonton, only a few took the precaution to sow their wheat early in the spring of 1881; these reaped good crops in good condition and comparatively early, although the summer was cold, wet, and backward; the others (not practical farmers) who allowed their opportunities to slip by unimproved, had a late harvest and poor crops. Similar ignorance or neglect will produce similar results in all northern climates, where the season, while amply repaying proper farming, leaves little spare time in the warmer months to those who postpone ploughing or sowing a fortnight or so later than it can first be done.

RAIN AND ALL FOR FARMERS' GROWTH.

The evidences of the agricultural capacity of the James' Bay country derived from actual cultivation is necessarily very meagre but is on the whole encouraging. Wheat succeeds at Lake Temiscamingue, near the south-eastern borders. Prof. Bell when three hundred miles north of Lake Nipissing was surprised by finding a Scotch farmer settled there for several years, installed comfortably in the midst of a forty-acre clearing, and cultivating oats, barley, turnips, potatoes, and other vegetables to sell to Hudson Bay traders and Indians. The farmer had sowed wheat one year for an experiment and it ripened well. As there was no mill he had not attempted wheat as a regular crop. This farm is about 100 miles from James Bay.

Mr. George Gladman, who resided at Moose Fort for fifteen years, says the climate and soil there are good; potatoes and vegetables were raised in abundance, barley ripened well, currants, gooseberries, strawberries and raspberries are plentiful—wheat had not been tried—horned cattle, horses, pigs and sheep thrive. Last century Mr. Ernst, who resided at the Fort for many years, stated in a book published by him that barley, peas, and beans succeeded well "although exposed to the chilling winds which came from the ice on the bay." In another book he says—"Sown wheat has stood the winter frosts and grown very well the summer following, and black cherries also have grown and borne fruit." Mr. Edward Thompson, for three years surgeon at Moose Fort, says he has seen far

BETTER BARLEY AND OATS AT MOOSE RIVER

than he ever saw in the Orkneys but the quantity sown was small. "There was ground enough broke for corn (grain), but never any encouragement given for sowing it but the reverse the Governor forbidding it for no other reason than that if corn (grain) had been sown a colony would soon have been erected there." Prof. Bell, in the latest of his reports which has come to hand speaks very highly of the country for grazing and dairying. Besides its cultivated grasses it produces in some parts, particularly in the south west and western shores of the Bay near Fort Albany 60 miles further north than Moose Factory immense quantities of wild hay. At Moose Factory oats, barley, beans, peas, turnips, beets, carrots, cabbages, and onions

are cultivated with perfect ease, while even the tropical tomato succeeds. As the soil and peculiar exposure of Moose Factory are unfavourable, the fact of this success augurs well for the future agricultural development of the more southern country inland. That all the flora is the same as that around Quebec is cited by Prof Bell as a proof of the mildness of the climate.

Finally, Mr. Alonzo Wright, M.P., who is, perhaps, more conversant with all these facts than any other gentleman in Canada, has stated his views very ably in respect of this northern region—indulging in no theories—in his speeches in Parliament; the honorable member distinctly says there is a territory there

BEYOND THE HEIGHT OF LAND,

capable of affording homes for millions of people, and Thomas Keefer, Esq., C.E., gives it as his opinion that the mineral resources of the district as a whole are the most promising of any portion of Canada. Therefore under these and all the circumstances herein set forth, I respectfully submit the same to the earnest consideration of the Government, and in order that the extent and variety of the actual resources may be no longer in doubt some appropriation be made to enable a thorough and practical exploratory survey to be undertaken without delay.

I. MURRAY MITCHELL, C.E.

Engineer-in-Chief

O. & O. V. & O. C. Railways.

Ottawa, Dec. 5, 1882

Notes on some of the Minerals of the Gatineau District.

Iron.—That this metal exists in large quantities is evident to every one who has examined the rocks. In many parts the quartzose rocks are so stained with the peroxide, that they might be taken for masses of red hematite. In other parts masses of ironstone are exposed on the sides of the lakes. In others veins of iron are found in the rocks. The horizon in which the beds of magnetite appear extend from Hull northwards to the Big Lake. The deposit at Hull is not only noted for its extent, but also for its superior quality and purity. Besides these deposits of magnetite, iron sand in large beds, and hematite is found in Mussawaki—at present an Indian reserve, but which, it is expected, the Government will soon throw open to settlement, removing the Red men further to the north.

Apatite or Phosphate of Lime.—The County of Ottawa has for some time provided a great part of this important mineral shipped from Canada. The quantity found all through the district between the Gatineau and Lievre is immense and will be wonderfully developed when the two branches of the railway are completed. In some parts the phosphate is seen in the rocks through which the roads are cut in other places as near the mouth of Post Creek in the Gatineau as the gable on the river bank. In Buckingham it is found in large beds and filling cavities in the limestone rocks. It is quarried in many townships, and proving very remunerative, large prices are given for lands known to contain it. That there will always be a large demand for Phosphate may be seen from the fact that immense quantities of phosphoric acid are every year taken out of the earth in wheat and other crops. The want of this phosphoric acid is considered in great measure, the cause of the comparative sterility of many districts which large crops of wheat were formerly grown. From calculations made in 1870,* it is shown that the shipments of cereals and pulse from Montreal in the previous year represented the large quantity of 2574 tons of phosphoric acid of a money value of $540 191. The export of wheat from British America was only 7½ per cent. of the total amount received by England in the shape of wheat alone which altogether, therefore, represents an amount of no less than 31 200 tons of phosphoric acid, of the value of $6 498 400 annually. What an immense amount therefore of Phosphate of Lime is required every year to restore to the earth the large quantity of so important an ingredient.

Graphite or Plumbago is in large quantities in Lochaber and Buckingham sometimes in beds of good material at other times disseminated yet in paying quantities, and sometimes in lumps of the purest metal. Some of the material analysed by Dr Harrington of the Geological Survey was found to compare very favourably with the best qualities imported from Ceylon. The use of this mineral is continually increasing. At present it is employed very extensively for writing pencils, for electrotyping purposes for crucibles, for blacking stoves and as a lubricant, so that there is always a good demand for it.

*Canadian Naturalist vol. V p. 245.

Galena, the most common ore of Lead, is found in many places in this County. Sometimes it is of so soft a nature that it can be cut into shape by a knife. It is in some quantity above Desert Village and at the N. E. of White Fish Lake, near the Big Lake, and in many localities in the Gatineau Valley. In Blake a vein was traced for more than 100 feet. This ore is very often argentiferous, and a specimen from the Big Lake, when analysed, was proved to contain a good percentage of silver.

Molybdenum.—This scarce but useful metal, is employed extensively in calico printing as a mordant and in giving to silk some very beautiful dyes. It has been shown, by different chemists, that by the action of different chemicals, it may be made to yield a great variety of fine coloring materials. As it has hitherto been found in only a few places it brings as much as $1 00 per lb. As the production increases and it becomes somewhat cheaper, the demand will also increase, and a remunerative business may be expected. It exists in some quantity in many townships, particularly in Hull.

Porcelain Clay and Kaolin or China Clay.—From the large number of feldspathic rocks in Canada, one would expect that large quantities of the material so important to the potter would be found in the country. Such however is not the case. The feldspars have too much iron in them for the manufacturer and the few potteries in the Province, have to import their material generally in the form of pegmatite rock from Cornwall and Devonshire. In many places, up the Gatineau at Hull, Aylwin, Wright, Cameron, etc., a very pure kind of white orthoclase is to be found, apparently suitable for this work, and if mined and put into the market will, perhaps prove a great benefit to the trade.

Kaolin or China Clay for the manufacture of fine porcelain and useful for many other purposes in the arts, has recently been found on the Aux Lièvres in numerous beds.*

Mica.—Although the Laurentian rocks abound with Mica, it is generally of such a dark color or of such small size as to be of little value. In the western part of this County, I have seen very large plates of white mica above 10 inches square. Although they were not of first quality as regards clearness and transparency, being taken off the outside of crystals exposed on the river bank, they give a great promise of good material when the outside sheets are removed. This useful mineral is in great demand and obtains as much as $8 per lb. for good size sheets of first quality.

Asbestos.—Among the many minerals found in the County of Ottawa, perhaps none are more remarkable than the veins of Asbestos found in Wakefield, Denholm and on the line of Ottawa and Pontiac Counties. This material has only lately been brought into notice as of economical value. Specimens of this rock fibre were found some years since in Canada, but the brittleness, and the coarseness of the fibre gave little promise of its becoming of any use. Of late years it has been found purer in composition and so much finer in structure that the greatest skill has been employed to devise machinery to bring it into use. These efforts have been successful, and the fibre has been

* Since the above was written, Kaolin in many places in the Townships of Blake, McGee, Wabasee and Dudley has been found and of a merchantable character.

J. M. M.

spun and woven into a fabric upon which the fiercest flame has no power. It has also been formed into a kind of cardboard, into lamp wicks, ropes and packing for the piston rods of steam engines, and a coating for steam pipes, for which it is well suited, being an excellent non-conductor of heat. It may be seen that the processes already employed only require development to make this a very important and remunerative manufacture. With improved machinery and experience, finer cloths may be made, forming incombustible clothing for those exposed to flame or intense heat. It is intended also to apply metallic dyes, unchangeable by heat, and so form not only an incombustible, but also an elegant fabric, which may be the means of saving much life and property. It would be impossible to mention the many useful purposes to which Asbestos may be employed; hearth rugs, table covers, hangings, drapery, may be suggested. Its remarkable power as a non-conductor of heat will render the thick cardboard, when covered with a good design, an elegant guard to save our woodwork from the heat of our stoves. Elegantly dyed cords and tassels of Asbestos would be a great improvement on the unsightly wires which retain our stove pipes in halls and public rooms. Again, the necessity of defending our water pipes from the destructive influence of the frost points to the necessity for a non-conducting substance, which will prevent the heat being abstracted. It is also now used extensively in the manufacture of paints. The Asbestos found in Ottawa County is remarkable for the great length of fibre and will no doubt be much sought for.

Serpentine and Marble.—Serpentine has been found in the valley of the Aux Lievres and at Desert Village. Some of the white crystalline limestones are of so fine a texture as to form a valuable statuary marble. Some of the coarser crystalline limestones appear so compact that they would no doubt bear a fine polish. At Desert Village is a church built of the stone of the country, a very close white limestone which has just sufficient color in it to make it pleasant and agreeable to the eye, and of a texture so hard as apparently to defy all the destructive powers of time and weather. A handsome green-veined Marble is also found in Denholm.

Coloring Earths.—Chiefly ochres (Hydrous Peroxides of Iron) are found in many of the Townships on the Gatineau, notably in Wright, Low and Denholm. They are found in a state requiring very little manipulation to render them fit for use and are of all shades of color from a light grey to dark red. At the present time such ochres are saleable at good prices.

Baryta is also found pretty plentifully between the Gatineau and Aux Lievres Rivers. It is used as a white paint, and after some preparation for it is the permanent white of the artist. It is also used as an adulteration to white lead.

Iron Pyrites is said to exist in very large quantities in Wright and several other townships. No doubt this will in time be put to use, as is done at Elizabethtown, in Ontario, in the manufacture of green copperas and of sulphuric acid, which might here be employed in reducing the native apatite to a form suitable to the wants of the farmer. This ferric sulphide often contains some small percentage of cobalt and nickel, which, by improved methods may be profitably extracted.

The Forests of Ottawa County.

Ottawa County has for a long time been looked upon as one of the principal lumbering districts of Canada. The valleys of the Gatineau and the Aux Lievres, hold the chief places for this important industry. For several years their woods have furnished a large amount of the white and red pine produced. As soon as the rivers are open in the Spring, the logs which have been cut during the winter, begin their journey upon their swift waters and down the numerous rapids, till about the end of September, when the booms, towards the lower parts of the rivers, have arrested them in their course, and hundreds of thousands of logs are enclosed, waiting to be sorted and forwarded to their owners. The lower parts of the County, through which these rivers flow, have been partly cleared of the largest pine and basswood; but thousands of smaller trees have been left, which are rapidly growing up, and many good sized trees still remain. The hardwood has scarcely been touched, as it is too heavy to be floated, and there has been no railroad to take it to a market.

In the Valley of the Aux Lievres there still remain whole forests of tamarack resembling the European larch, and much used in shipbuilding, hemlock, birch, beech, oak, elm, cedar and a good sprinkling of white walnut or butternut. From this part also a sufficient number to build both railroads (The Gatineau and Aux Lievres R. R.) could be provided, and with that in the Gatineau Valley, a large quantity for exportation as well as supplying all home and manufacturing requirements. The Railway will open a large market for all that can be spared. Even the smaller trees and timber unfit for other uses will find ready sale as cordwood. The hemlock useful for railway ties and many other purposes. Its bark is in great demand by the tanneries, and now that the supply of black walnut is nearly exhausted the butternut and birch will be much sought for and bring good prices. Cedar, of which large quantities still remain throughout the whole district, will always find a good sale also. The ease with which it can be made into shingles, and its property of power of remaining for years in wet ground, without decaying, make it invaluable for foundations and for railway ties, fence posts, etc. Good sized spruce and balsam are plentiful and very useful to the farmer for building his house, barns, stables and sheds.

For the necessary buildings of the Railway Company these woods will also be of great use. The poplar soon covers the country when the hardwood has been cut, and grows very quickly, thus as well as the soft maple is largely used in making pulp for the paper maker. It is also of use in the manufacture of furniture.

From what has been said it will be seen that all the woods required for ordinary use are plentiful and will prove a great saving of expense in the construction of the Railroad; growing generally where they will be used they will also save great time and trouble. The future settler will scarcely miss the timber removed from his land, and it will rather be an advantage to him to have his land partly cleared and the necessary roads made to draw the timber out of the bush.

BINDING JUL 2 9 1968

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MICHELL — OTTAWA COUNTY

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The University of Toronto Library
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The late Honourable Edward Blake
Chancellor of the University of Toronto
(1876-1900)

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(61)

To Alonzo Wright, Esq. M P, &c, &c

Sir,—

I have the honor to dedicate to you, as member of Parliament for Ottawa County, the annexed pamphlet, shewing the geology and mineralogy of the rich territory comprised within the said County of Ottawa The ancient Province of Quebec has nowhere within its boundaries greater sources of wealth, than in the county to which this pamphlet refers, and, if by your kind acceptance of this dedication, the attention of the Government and the public generally is more closely drawn to the importance of the subjects herein referred to, the object which I have had in view will have been accomplished.

I have the honor to be,
Sir,
Your obedient servant,

J MURRAY MITCHELL, C E

187581
20/2/24

OTTAWA & GATINEAU VALLEY RAILWAY

AND OTTAWA COLONIZATION RAILWAY,

Office of the Engineer-in-Chief

GENTLEMEN,

I have the honor to transmit for the information and guidance of the Directorates, the accompanying reports relative to the geology, mineralogy and general features of Ottawa County and the territory north to James' Bay, with a view to the ultimate extension of the Ottawa and Gatineau Valley Railway to that latitude

I have the honor to be Gentlemen,
Your obedient servant,

J MURRAY MITCHELL,
Engineer-in Chief

TO THE PRESIDENT AND DIRECTORS
O & G V and O C Railways,
Ottawa.

OTTAWA COUNTY

Its Resources and Capabilities

Exactly what area of country is comprehended under the above title, cannot as yet be stated Its northern limit has not been determined by actual survey, and may, perhaps, be placed at the south west shore of St James' Bay, or else at the southern boundary line of the Hudson's Bay Company's territory, at the height of land If we give 14,000 square miles as its contents, we shall, perhaps, be near—certainly inside of—the mark for the last supposition for the northern boundary Although it is the county which has paid the greatest revenue to the Provincial treasury, it has so far, received very little in return As yet quite a large portion of it has not even been surveyed for settlement Its natural wealth has been the cause of much of this neglect The millions of dollars worth of lumber its forests contained has been conserved for the enriching of three or four firms, whose only care has been the barring out of settlers, who might intrude upon their timber limits and a steady resistance to all improvements which might direct attention to their monopoly, and also enhance the value of the commodities they purchase in the district This furnishes an answer to the query, why so valuable a section of country is so thinly populated Farmers must depend altogether upon the lumber trade It is that which sets the value both on labour and produce Of late years, fair roads have been constructed in some localities, and this has struck a heavy blow at the lumberers' power, for improved travelling facilities have militated greatly against the nefarious "truck' system, which is generally made the rule in backward places. Wherever it is possible for the produce to be brought to market, and for necessities to be purchased without restrictions of 'truck' or barter, prosperity is invariably the rule The Townships of Lochaber, Buckingham, Templeton, Hull, Eardley and West Wakefield may be cited as proofs of what I assert. There is no reason why the Townships of Egan and Kensington, for instance, should not be as opulent and prosperous as any of these, had they the same advantages of travel The soil is said to be equally good, probably better, and the land generally is not so rough When the length of the journey to market has been reduced from four days to as many hours, we may expect the natural richness of the land to declare itself At present these more northerly townships produce for sale only hay, oats and potatoes as these products always sell in the shanties. Very little wheat is grown there, although a late *Pere* of the district declared that sixty bushels had been reaped for one bushel sown There is no rotation of crops and the little farms are robbed of the material which should be returned to them in the form of manure What wonder if the inhabitants of this end of the County are few, when the virtual rulers there are men whose interests clash so decidedly with those of the settlers But the lack of inhabitants is

not an unmitigated evil. In order to work the land it must first be thoroughly cleared of trees, and as pine is almost the only marketable lumber owing to the impossibility of floating the heavier hardwoods, the maple, oak butternut, birch, beech, basswood, elm, &c, are rolled into heaps and burnt out of the way When the railways are completed, all these woods, now so largely used for ornamental and other purposes, will be of very great value, owing to the sudden failure of the supply of black walnut Black birch, the only satisfactory substitute has almost doubled in value during the past few months Had the land been cleared before railway communication with the trade centres was established, all the birch and other hard woods must have been burnt, and thousands of dollars lost to the country Every Township has some of these woods and many of them have immense tracts of birch, oak and maple of fine growth and quality Soon nothing but the mere brush need be destroyed, as the demand for firewood in Hull and Ottawa will provide a ready market for everything else

We may reasonably expect also that the Gatineau, Aux Lievres and smaller rivers will be found to furnish advantageous sites for mills and factories, for the turning out of wooden wares and implements Of late years quite an important and lucrative trade has sprung up in paper pulp The whitest and most fibrous woods are chosen and taken to the mill in short lengths, then, having been freed from knots and bark, the blocks are brought into contact with rapidly revolving, coarse millstones, and by degrees ground into minute fragments Sometimes the wood is reduced to pulp by a more complicated process, necessitating a very high pressure of steam but the former is the commoner and probably cheaper system With this article Ottawa County could furnish the whole paper trade for years to come. The woods at present looked upon as most useless, such as white birch, poplars and soft maple, are just what the business requires and will doubtless be seen to have a real value, when the attention of manufacturers has been attracted to this district On the line of the Quebec Central Railway, the extension of the S E T & K R R, a good trade is done in short logs of spruce and balsam, which are manufactured into packing cases for the English market There is no reason why the Gatineau line and branches should not bring thousands of feet of such material to the factories—at the present time there is an actual demand in Ottawa for an unlimited number of shingles for shipment to the United States Cedar shingles sell for $2 75, pine for $3 00 per thousand This price offers so fair a profit, that a gentleman of my acquaintance is actually fitting up a small steam mill for the manufacture of shingles during the winter, and expects to make money by it, though the shingles when made will be carted to Ottawa, a distance of over 60 miles What then would his profits be, were the projected railway completed? And any number of such mills could be kept in operation in the County so far as the raw material is concerned Then there is no reason why hemlock bark which sells at from four to eight dollars per cord, and oak bark much more valuable to the tanner, should not be sent out of the County, so soon as means of carriage have been provided Taking these and other similar facts into consideration, I feel sure that the woods of the country are yet to yield such profits as will agreeably surprise those who fancy the bush worse than valueless, after the pine and fencing cedar has been taken away

As at present situated, however, we can scarcely wonder at the antagonism shown by the farmers to the trees. He knows that just where the bush is thickest, and the wood largest, he will find his best land. So with no market near, no means of conveying the timber to town, what wonder if he chops the trees, rolls the logs into heaps, and destroys them by fire. Invariably the first year's crop reimburses him for his trouble. The writer has seen oat and wheat straw seven feet high on new land, though the seed was only scratched into the ground with a heavy harrow. Indeed the crops thrown off by the farms in this country are, as a rule, wonderfully good. That the soil is rich, generally speaking, is proved theoretically by the presence in great quantity of crystalline limestone; practically by the immense growth of the timber, *En passant*, I might mention the fact that the huge pine board, exhibited at the Great Exhibition, England, was cut from a tree found upon a well-known "limit" in this County. True, a good third of Ottawa County is taken up by rocky mountains, which present a decidedly rough appearance to the dwellers in prairie land districts. But the general excellence of the remaining two-thirds fully compensates for this rough portion. Where cleared and farmed, the crops are nearly always good. For instance, one farmer had 80 cwts. of flour (200 bush.) from 6½ bushels of spring wheat; another had 80 bushels, from 2 bushels sown, and I could multiply instances indefinitely. Oats yield on an average 20 to 30 bushels to the acre, rye 25 to 35 bushels—root crops are always most successful. The arable land varies from light loam to heavy clay; from warm sandy to black muck. And then the hills are of very great service to the farmer. As soon as the snow leaves them in the spring, they are covered with sweet succulent grass, than which nothing could be better for cattle and sheep. In fact for stock raising the district could scarcely be excelled. The quality of the mutton about equals that of the Welch mountains, and if South Downs were introduced, could be improved as to size, and so well fitted for the English market. At present prices are absurdly low so low indeed that farmers, as a rule, keep only enough sheep to furnish their houses with flannels and wool, and sell the lambs at the end of the autumn. This year lambs sold at that time brought from $2 to $2 30 each (*i.e.* from 8*s* 4*d* to 9*s* 6*d* each). But then the buyer had to drive the flock from 30 to 90 miles to the nearest railway station. For sheep there is no sale at all; for beef the meneger of one of the great lumber firms is offering this autumn $2 per cwt, though even in Ottawa it at present sells at from 4¼ cents to 7 cents per pound live weight—already some of the more wide-awake farmers are preparing to participate in the cattle export trade. Stock is being improved, wintering capacity increased, and herds enlarged. It is felt that a share in this, the best paying of all the export trades, of right belongs to the County, though the lack of steam communication with the seaports has heretofore prevented farmers from taking part in it. There are now some of the finest Durhams the world has produced, on the larger farms along the Gatineau River, and the grades obtained by the union of these and the hardy, well-built cows of the country, will satisfy even the fastidious taste of the English butcher. In short, as soon as the road to a fair market is opened, there can be no doubt but that the inherent capabilities of the soil will be brought out much to the advantage of the farmer and the prosperity of the country.

But if all this were not the case, there would still be most power-

ful reasons for considering this the most valuable county in the Province. The minerals its rocks contain will certainly give it a foremost position, even in the country—boasting the mines of St. Joseph, Beauce, Capelton, Thetford and Orford. Geologically speaking the rocks of the country consist of "alternations of gneiss, crystalline limestone and pyroxene strata," interstratified with several species of quartz, feldspar, &c. They contain many minerals of economic value, especially the following hematite magnetic and titanic iron galena, apatite, plumbigo, molybdenum mica and asbestos. Many of these rocks plainly show their igneous origin, and have been subjected to much attrition. Gravel beds of considerable magnitude, and plains of coarse and fine sand complete the evidence for the glacial progress, which has ground down the once far loftier Laurentides to their present altitude. There are not wanting evidences also (*Vide* peculiar boulders mentioned in following report) of the presence of icebergs—upheavals, contortions and fractures of the rocks are borne witness to, on every side, by twisted overlapping and upright strata. Although, therefore, an interesting district to the geologist, it is the more laborious to the prospector, on account of its irregularities. He must expect that the valuable mineral veins will partake of the character of the bearing rock—that is to say, that a vein which crops out strongly in one place, will be buried under strata of indefinite thickness in another, that a leading vein will end abruptly, where the layers of rock assume a vertical position &c. and therefore I cannot but conclude that to pass a verdict upon the wealth of the County, limiting it to the mere surface indications, is to do it an injustice. Perhaps it is equally rash to argue from the seen to the unseen, but we may certainly hold that a plain "fault" does not of necessity imply the absolute loss, mineralogically speaking of the vein. Then the result of all explorations must be taken merely as comprehending the *displayed* wealth of the rocks. The remainder will not be manifest until 'leads' have been laboriously followed, 'breaks" in veins looked up, and what Colorado miners term a "pan rock" discovered in every instance, and then the numerous detached beds or pockets which exist (as I believe) will require to be carefully looked after by stratagraphical experts, who must also be experienced mineral hunters.

At the present time the most important mining industry in the County is that of apatite. Although dating back only some 6 or 7 years here, it has already assumed immense proportions, and is now steadily on the increase. Nor can this be wondered at, when the wonderful productiveness of Canadian apatite is taken into consideration. A sample taken almost at random—from a heap on the wharf landing—of the High Rock Mine, Portland, gave on analysis 89 785% tribasic phosphate. The product of another mine in Buckingham gave 41 080% phosphoric acid, equal to 89 682% tribasic phosphate of lime. According to the official report of the Analyst to the Government Geological Survey, this is about the average yield of the apatite in this country. I give, in a note, a full report of the analyses in two cases, taken from the Report of the Geological Survey for 1877-78. For comparison's sake I may state that the well known mine of white (?) apatite, at Estramadura, Spain, yielded but 75 601% tribasic phosphate, that of Staffel, Germany, but 75 270%, and the specimens analysed were I understand, selected with some care. So much for the quality of the apatite. As far as quantity is concerned,

the annexed report speaks for itself, of the surface indications of the Townships examined Information has been received respecting lands to the north of Bigelow, which leads me to state that those who held that the apatite gradually decreased in volume northwards were most probably not altogether in the right For instance in North Blake a vein has been discovered running about N E and S W, which affords excellent exhibits of phosphate It is there associated with pyroxene and small quantities of dark mica, the enveloping rock being mist coloured gneiss and occasionally flesh coloured calc spar At the north end of the Pemmichangon Lake, an upright rock of tilted strata displays a beautiful vein of the vitreous dark green apatite I have seen a specimen obtained 40 miles above the Desert Village, on the Gatineau crystalline and evidently extracted from a deposit of some extent From lumbermen who have travelled miles beyond the prospectors' northern limit, I have heard of nameless rock bound lakes whose sides exhibit green apatite in veins of varying width At the lower end of the County discoveries are constantly being made though only a few *very* large deposits have been found

As regards the demand for phosphate, that I am assured, is unbounded The multiplicity of uses to which it is now applied, promises a ready and *pro ratio* increasing market for all that can be found Its richness places it nearly at the head of the price list, and, if any, the poorer grades as *e g*, the Spanish, must drop out From the ease with which the Canadian is mined it should brook no competitor and when the projected railways are finished it will be possible to place it on the London wharves for little, if anything, over $8 50 or $9 per ton But at present the lack of direct rail communication with deep water navigation presents an almost insurmountable barrier to the development of the phosphate industry The trouble and expense of handling such heavy material over country roads, in a rocky, mountainous section, effectually prevents the mining of far away deposits. The same may be said of the iron ore of which assays show an unusually high percentage of metal This, of course, cannot be mined to advantage, until the fuel is brought to the mouth of the mine by some cheap transport service At present one of the many deposits of magnetic ore is being worked, and the crude ore shipped out of the country This is a loss all round The ore, *i e* iron, refuse and all, is freighted *to* the fuel And then too, the industry which should be providing labour for our own people is all to the benefit of another nation As the report by Mr E T Chambers shows, the country is very rich in iron ore The assays conducted at the Templeton and Hull mines, have sufficiently established the value of the ore—and so with regard to galena An enterprising prospector discovered a promising deposit of galena, to the north of the Township of Blake In miners' parlance he "stripped the show" and sunk a small pit By actual crucible test he established the fact of the argentiferousness of the vein, but could go no further The land just around is Government property (unsurveyed, I believe) there are no roads near the development of the mine required a large capital and as no Company would purchase a claim in such a remote and secluded district, it has been abandoned On the 5th Range of Wright, an exhibit of promising galena has been discovered, and will doubtless receive the attention it deserves, as soon as the Gatineau main line has been constructed On the 1st Range of Aylwin, near the river, a peculiar hard galena

has been found Of less valuable minerals, the Pine Sea district, in Bonchette, affords a considerable deposit of pyrites in mass This should be thoroughly tested, as it is impossible to say of what value it may not be The quantity is sufficiently large I understand, to allow of its being worked to advantage for cobalt, if the percentage it contains of it is anything above a decimal

A gentleman on the Upper Gatineau, who possesses magnificent beds of fine close-grained limestone in Northfield Township, was offered $2 25 per foot for many tons of the marble delivered in Ottawa but could not accept the offer owing to the length and difficulties of the road I sent specimens of a deposit of coarser marble to a leading stone worker in Montreal, and was assured by him, that a well-stocked quarry of such material was a very valuable property The quantity at that place is unbounded a stratigraphical geologist declared it to be an outcrop of the marble belt which turns up at Arnprior, and has become of such value there From a neighbouring Township I was shewn specimens of a green veined and mottled marble, which ought to command a very high price at a fair market

Amongst the resources of the County we must certainly give a place to the various colouring earths found within it Beyond a doubt, these are of very great value and will very soon prove to be important sources of revenue to the Province Last year a United States chemical company was prosecuting enquiries in this very district, with a view to the purchase of all these deposits The colour (raw) of the earths varies from very light gamboge (ochre) to dark rich Indian red (peroxide stain) Nearly all the intermediate shades of yellow, brown and red have been found and generally in very fair quantity Range C, of Denholm furnishes faint coloured ochre; the XIth, of Low, dark red matter the Pine Sea country at least three other shades; the XIth (?) of Aylwin a very dark and rich yellow Probably many such beds exist, which have not yet been brought to light. I have seen several houses which have been painted throughout with colours obtained from the land, merely mixed with raw oil

Of graphite or plumbago, I must not allow myself to say very much, as this sketch has already run on to greater length than was intended The Townships of Lochaber and Buckingham, contain mines which have been worked successfully in the past, though ignorance on the part of employees, in some cases, incompetency on the part of a manager, in another, and too great speculation in other instances have caused all work, I believe to be suspended at the present time Experts and members of the Geological Survey all agree that the quality of the plumbago is excellent and the quantity unlimited The second and third ranges of Hincks are also well furnished with this material Of course for a substance in such common and general use, there is always a good demand.

And now to conclude, I think, that although I have only glanced at the resources of the County, enough has been written to shew that the building of two lines of railway through it will be of the utmost importance not only to the people of the district, but also to the Province at large It means the opening up of what is practically a new country, and also an outpouring of minerals which must result in a largely increased revenue, an augmented population, and the prosperity of its deserving inhabitants Thousands of dollars annually lost to the Province, will be saved Government property will be more

than doubled in value, and emigration, and above all colonization will be encouraged After all, it is that, that this Province requires something to encourage its own sturdy manly sons, to remain at home and as soon as they find, that it is possible to do well in their native district, that they can readily obtain its real cash market price for every thing they can raise or grow, that the very bare rocks, open to their touch and disclose mines of wealth, that this labour has a high money value the allurements of a neighbouring Republic, and the visionary hopes a prospect of the Great Lone Land, will alike fail to charm them away. It has been so often demonstrated, that it is now accepted as an axiom, that the railway is the greatest "enricher," the greatest "colonizer" the world has yet seen, and the railway, perhaps never had a nobler object to perform, a more important office to fill, than now lies before it in Ottawa County

NOTE

Analysis of specimen of apatite from the twelth range of the Township of Buckingham:

Phosphoric Acid	41·080
Fluorine[2]	3·474
Chlorine[3]	·260
Carbonic Acid[4]	·370
Lime	49·161
Calcium	3·803
Magnesia	·158
Alumina	·705
Sesquioxide of Iron	·125
Alkalies	?
Insoluble residue	·370
	99·506

1=89·682 Tribasic Phosphate of Lime
2= 7·134 Fluoride of Calcium
3= 0·406 Chloride of Calcium
4= 0·840 Carbonate of Lime

Specimen from seventh range of Portland where exposed veins measured twenty feet across:

Phosphoric Acid[1]	41·139
Fluorine[2]	3·863
Chlorine	·229
Carbonic Acid[4]	·223
Lime	49·33[illegible]
Calcium	4·195
Magnesia	·180
Alumina	·566
Sesquioxide of Iron	·094
Alkalies	?
Insoluble residue	·060
	99·884

1=89·810 Tribasic Phosphate of Lime
2= 7·929 Fluoride of Calcium
3= 0·378 Chloride of Calcium.
4= 0·507 Carbonate of Lime

THE GATINEAU VALLEY

(Route of the Ottawa and Gatineau Valley Railway)

ITS GEOGRAPHICAL & TOPOGRAPHICAL FEATURES ETC

The Gatineau Valley may be said to comprise the whole of the district from the range of hills eight miles east of the Ottawa River to the eastern boundary of the Lievre River, a distance of say some 100 or 150 miles, the northern boundary being placed at the watershed of the rivers, running in a southerly direction, about 150 miles from where the Gatineau empties itself into the Ottawa River. The country partakes of all the features peculiar to the Laurentide district. Five ranges of abrupt rocky hills rise one above another, their direction being generally east and west. As a rule, however, these ranges are very much broken, especially near the river front. Tracts of plain country, generally some miles in extent, are to be found in every direction, while in the basins formed by the dips of the hills are clear lakes, teeming with fish, and varying in size from the insignificant pond to the expanse of water 40 miles long by 30 broad. The hills are usually covered with choice succulent grass, which provides the finest possible grazing for sheep and cattle. The soil of the table lands and plains varies from a light sandy to a rich loam, from stiff clay to dark or black muck. Oats, barley, rye and maize may be grown to advantage everywhere, while in the heavier soil wheat will always yield an abundant crop. As yet, however, the capabilities of the soil have not been thoroughly tested, lumbering operations having heretofore occupied the whole attention of the settlers. Now, however, that the country has become almost denuded of pine farmers are rapidly clearing the land and the results, generally speaking, may far exceed their expectations. The great drawback with the most of them is the distance from a market rendering it almost impossible for them to dispose of their produce and stock.

The rocks consist of a series of metamorphic sedimentary strata, and are the oldest known to geology. They are altered to a highly crystaline condition and are composed of feldspathic rocks interspersed with important masses of limestone and quartzite. They enclose a vast number of useful and interesting minerals, including galena, apatite (phosphate of lime), plumbago, mica, asbestos, hornblende, garnet, serpentine, tourmaline, kaolin, molybdenum, marbles, etc. and also immense masses of iron, sometimes magnetic, but more often titanic. The only remains of animal life known to exist in this series is the eozoon, though I believe that the large quantities of carbon found in the form of graphite also points to either animal or vegetable origin.

The townships which will at once be benefited by the projected railway are the following:—Aumond, Seattle, Manwaki, Kensington, Egan, Lytton, Blake, Bouchette, Cameron, Wright, Northfield, Aylwin, Hincks, Lowe, Denholm, Masham, Wakefield and Hull. Of

the most northerly of these, very little is known. Pine of excellent quality is found there in great abundance so that these four townships remain as yet in the hands of the lumbermen. Hard wood, such as maple oak, birch and beech attains a large size there, but is at present of no value, owing to the difficulties of transportation. The size and quality of the timber gives unmistakable proof of the richness of the soil beneath, and as the land is on the whole very flat it will become of great value as soon as farmers settle upon it. At present the total number of the inhabitants of these townships does not exceed 300. Excellent specimens of phosphate of lime have been found there, and it is probable that large deposits of this mineral will be discovered when the verdure which at present hides the rocks is removed by the settlers. Good veins of merchantable asbestos have been reported, but did not come under my notice.

Following a southerly direction the next township reached is

MANIWAKI.

This township is destined to be one of the most important from an agricultural point of view, in the whole Gatineau district. It has an acreage of 46,000 acres, of which 35,000 acres in tillable land of the greatest value the soil being generally a rich black loam. Of the remaining 10,000 acres 8,000 would form excellent pastures for sheep. The land is level, as gently rolling as a rule, though somewhat broken to the south by stray ridges. Scarcely a fourth part of the township has been cleared as yet a considerable portion of it having been retained by the Government as an Indian reserve. The uncleared portion is thickly covered with fine timber principally pine, cedar oak and birch. Owing to the impossibility of conveying the heavier, though more valuable kinds to a market by water lumbermen have heretofore contented themselves with the best specimens of pine cedar only. The hardwood yet remains, therefore and will doubtless make a rich harvest for the lumber merchant as soon as he is furnished with the means of removing it.

THE VILLAGE OF DESERT

is already a place of some importance, and as the present terminus of the line will probably soon swell into a town of considerable proportions. It is situated just at the confluence of the Rivers Desert and Gatineau and is the principal trading post for the Indians and trappers north of this point. It already has streets properly laid out hotels, stores, a Roman Catholic granite church capable of seating 2,000 people convent, etc. In the garden attached to the sacristy the Rev. Father Prevost, the local Superior of the order of Christian Brothers, has succeeded in raising castor oil plants in such abundance as to enable him to manufacture oil from the seeds. The sorghum sugar cane has also been found to grow there to advantage. The Rev. Superior is a true lover of his country, as evidenced by his desire to develope all of her resources, and as such showed the members of the survey every possible kindness, recognizing fully the greater importance to the district of the work in which they were engaged. The last census gives the number of families in the township as 650 including settled Indians. Geologically speaking not much is officially known of Maniwaki. The rock is principally either a porphyritic, granite or primary limestone. A white

crystaline limestone—considered an almost infallible sign of the best agricultural land—was found in close proximity to small beds of apatite Upon the third range near Messrs Hamilton's farm, a good promising exhibit of argentiferous galena was noticed in a boulder fragment The percentage of silver would, I feel certain, enable this ore to be worked to good advantage, provided a sufficiently large vein were discovered Upon the second range iron sand has been found, the percentage of iron being very high Hematite iron ore abounds in this and adjoining townships. Of

BLAKE, CAMERON AND HINCKS,

three of the townships on the east side of the Gatineau, I know very little, the rapid progress of the survey leaving a visit to them quite out of the question From specimens procured for me by kind friends, I should say that Cameron and Blake will well repay the attention of mineralogists. An ore obtained from Thirty-one Mile Lake contains copper, with a percentage of silver, almost if not quite equal to the surface indication of the world favoured Mount Bross mine of Colorado Magnetic iron ore of the same quality as that worked to such advantage at Templeton is found there, and I have also seen good specimens of apatite brought from the same district I am afraid I must disbelieve the many stories current amongst the country people regarding the discoveries of gold in these districts. If found at all it will propably be in very small quantities too small in fact to pay mining expenses Hincks according to a well known authority upon the subject, is rich in phosphate of lime The specimens I have seen tend to prove the statement the quality being excellent and the quantity, I am assured, unbounded Galena of a very soft nature has been found there and would probably yield a good return if mined for lead only Plumbago I found therein wonderfully large quantities, and as soon as a separating process has been perfected will repay the cost of mining

NORTHFIELD

and Denholm, on the same east side of the river, are also rich in mineral The former, which lies between Cameron and Hincks has a population of 400 and is assessed for municipal purposes at $25,000 The great phosphate belt known to pass northward keeping the east side of the river from Templeton and Portland up, crops out in the most promising manner at Northfield The surface indications can perhaps, scarcely be surpassed, though not at once evident to the superficial observer A limestone of a highly saccharoid texture has lately been discovered there, which will probably yield a marble suitable for statuary and will certainly command a high price when brought to market A most valuable iron ore exists in large quantities The same remarks will apply exactly to

DENHOLM,

the township to the south of Hincks Phosphate and marble both promise well there An ochre of good quality is found in a very large bed in Denholm, and now that colouring earths are rising in value, bids fair to become a valuable property Both townships contain good farming lands though Northfield seems to have the advantage in this respect. We may, perhaps, give 25,000 acres as the extent of arable land in Northfield, and 12,000 or 15,000 of that in Denholm Generally

speaking both townships are hilly, Denholm especially so, the tillable land being found generally in the valleys. Both are well watered by lakes and streams and offer good inducements to the sportsman.

Returning to the west side of the river we have first to deal with

BOUCHETTE,

the township to the south of Manwaki. It has an acreage of 45,000, of which perhaps 25,000 is arable land. To the north the land is very light and sandy, but improves as one proceeds southward. There is a great deal of quite level land which would produce excellent roots and to the south cereals also. The hills are in some cases quite bare, having been denuded of soil by successive fires. We found many interesting pockets of phosphate of lime, containing perhaps from 50 to 150 tons of mineral apiece, and also whole mountains of iron ore. Graphite, I noticed, existed in some spots—perhaps in paying quantities on the Northfield farm. There is a good deal of birch in Bouchette, and as this is now one of the most valuable woods it will be rapidly disposed of as soon as the Gatineau Valley Railway has become a reality. The population is, say, 450, the assessment being at present $49,000.

WRIGHT

is at present a most important township. It has an area of 48,000 acres, $\frac{3}{4}$ of it is good arable land. The soil is a loam with occasional beds of clay. Several large farms have, by the use of modern machinery, been brought into an excellent state of cultivation and will repay the care bestowed upon them. Wheat of a sample difficult to be surpassed is grown there, while roots attain the largest size. The population is about 1,000, consisting principally of farmers of the better class. The village of Victoria has already been properly laid out and has a Roman Catholic Church, Court House, agricultural exhibition buildings. Its inhabitants number upwards of 200. The Blue Sea district to the west of the township is rich in minerals. Colouring earths of various shades are found there in quantities. On lots 6, 7 and 8 of the fourth range specimens of the most valuable phosphate have been found. Considerable deposits of the same substance were noticed in other parts of the same township. Copper has also been discovered in small quantities.

Along the banks of the Pickanock River are valuable tracts of timber land, oak and ash being found there to the finest size and value. The assessment for municipal purposes, is $65,000.

AYLWIN

in its general features closely resembles Bouchette, so that I need not repeat myself here, but refer you to what was said of that township. It has several fine farms of large extent, all of which invariably yield rich yearly returns. The population is, say, 800. Aylwin has been *par excellence* the pine producing district, and now possesses but little merchantable lumber, bush fires having from time to time swept almost the whole township. Its minerals comprise phosphate in fair quantities, peroxide of iron, graphite, garnet and talc.

LOW

may be set down as an extensive township. It has a total area of 64,000 acres, of which little more than half is arable land. The soil

alternates between sand and blue clay The crops raised are nevertheless fair though the land cannot for long remain of any use under the rude system employed by the majority of the farmers. It has a large population, as compared with the other townships, but I am unable to give the figures The hills are abrupt and rocky, though very little rock is found in the flat districts To the south the country is very much broken by deep precipitous gulleys. The rock is principally pretogine of an unpromising nature Some small pockets of phosphate were noticed at the north end of the township Narrow veins of asbestos were also discovered Coloring earths of most pronounced colors were found on the 11th range Its present assessment is $66,000

MASHAM

is the farmers' township, the percentage of arable land being probably higher than that of any of the surrounding townships The soil is principally a heavy loam, which raises the finest cereal and root crops It has not much rock and very little valuable mineral at the front To the west iron abounds, and small deposits of phosphate have been discovered Gold in small quantities has been noticed by members of the geological survey The township is well settled by a most energetic lot of well-to-do farmers Of

WAKEFIELD AND HULL

it is quite unnecessary for me to say much Both townships have for many years been well cleared and found to contain excellent farming lands Geologically they are well known, having been thoroughly explored by well known experts Vast quantities of phosphate are found there and a number of mines are at present in operation I must not close this report without reference to the class of horned cattle the country contains The influence of the large depot farms has been felt in this direction the presence of thoroughbred animals of the Durham and Ayrshire breeds having had a most beneficial effect upon all the cattle, consequently there is to be found there just the kind of stock the export trade requires—the broad deep short-legged beeves which at once take the eye of the British butcher Taking this fact in connection with the grazing facilities of the whole valley we cannot doubt but that in a short time a most lucrative trade will spring up, provided the means of rapid and easy transportation are at hand

The farms of Alonzo Wright Esq, M P— Hamilton Bros, Ross Bros, Hall & Co, Gilmours Luke Honey in Aylwin, and others for extent fertility and general condition, are equal to any on this continent The root and other crops in most years have been superior and have always been equal to those raised on the best lands in other portions of the Dominion of Canada

As might have been expected from the nature of the country, the Gatineau River and most of the streams running into it offer many most advantageous sites for mills and factories As the number of timber shoots upon the main river and its larger tributaries testify, we need go back but a very short distance to find natural falls, with a head of water capable of furnishing motive power to mills of the largest size.

THE AUX LIEVRES VALLEY

(Route of the Ottawa Colonization Railway)

GENERAL NOTES FROM LATE REPORTS OF THE CHIEF ENGINEER.

Rich as the Gatineau Valley on the west side of the river undoubtedly is, there can be but little doubt of the superiority of the east side, from a mineralogical point of view. Of course, as before stated, the west side has not received the same general attention as has been given to the district between the Gatineau and Aux Lievres Rivers. Valuable deposits of apatite, galena, copper, iron and kaolin have been discovered in certain localities along the route of the Gatineau Valley Railway line, some of them quite recently. But on the east side, the section traversed by the survey of the Ottawa Colonization Railway has long been known to be *par excellence* the phosphate region of the American continent.

To show this more clearly, I refer you to the map of the County of Ottawa. If from a point to the north of Cameron township, a line be drawn in a direction due east to the limit of McGill, and from this latter a southerly right line be extended to the county limit of Buckingham, the rectangle completed by the Gatineau and Ottawa Rivers, the rectangle will be found to contain some 600,000 acres. Then I am under the mark than otherwise when I assert that 250,000 acres of the enclosed district has been found upon actual exploration and examination, to contain phosphate in large, well paying quantities.

In other words the two great belts of this mineral, which may be traced from their point of convergence, near the gore of Templeton northwards to the extreme limits of the Laurentian area, cover nearly one-half of the circumscribed portion of Ottawa County.

This does not include all the apatite of the district. Crystalline deposits, varying in quantity from a few glittering crystals to the pocket containing thousands of tons have been actually found in, with few exceptions, every portion of every township not actually run over by either of the great bands. The trade in this mineral is in its infancy, although at present the activity witnessed at the various mines in working is very great.

As a fertilizer it has to seek a market in older countries, hence shipments are now made to England, France, Germany and the United States, and the ultimate result of largely increased demand cannot be considered doubtful. Already English and French farmers induced by the great superiority of phosphate to the compound termed "guano" ordinarily sold, have arrived at beyond the experimenting point, and the demand appears to be even now very much greater than the supply.

As an illustration of personal experience, I may state that in my position as Chief of the Scientific Commission in Mexico, I was induced to study the action of phosphates on tobacco lands. I can demonstrate to those interested in agricultural pursuits that apatite is of

infinite more value as a fertilizer, cheaper, and its effects more permanent or lasting

In Ottawa County some companies are vigorously at work at the south end of the County viz., in Templeton, Buckingham and Portland, and the richest and most important in working are known as,—the "Bonanza," in East Portland, the property of W. A. Allan, Esq. the "High Rock," owned by Messrs. Pickford, McIntosh & Co., and the 'Emerald," owned by Messrs. Murray and Allan. In connexion with the development of the phosphate mining of this County, the party have received much valuable information from Mr W. A. Allan (now residing in Ottawa) who may be said to be the pioneer in phosphates in this country, and is probably more conversant with the various townships and their resources than any other gentleman inasmuch as he has, for a period of eight years, employed his own experts in prospecting for mineral, hence his experience and information is regarded of first importance, and of greatest value

In spite of the drawback of being compelled to haul the mineral over several miles of country roads, and under every conceivable drawback, this industry gave employment last winter to thousands of men and fully three hundred teams, and probably yielded its promoters rich returns.

Upon the opening of navigation, a steamer, for the purpose of towing barges on the Aux Lievres, was very successfully run by the proprietors of the 'High Rock" Mines, and some 20,000 to 25,000 tons mined and shipped during the season

South east of the County, that is, in the townships of Lochaber, Mulgrave Derry and Buckingham, are immense deposits of plumbago The material is of superior quality as is generally known Some specimens obtained have been favorably compared with the products of the well known mine in Cumberland, England Others of a softer, less friable texture promise to be even more valuable from a commercial standpoint

On the 4th and 5th Ranges of Buckingham, and the 6th and 7th of Lochaber, the plumbago hardens—if I may be allowed the expression—into a galena, certainly argentiferous in many cases

Near the famous "High Rock" Mine alluded to some of the finest jasper, perhaps ever brought to light in any country was observed Jasper also abounds in Denholm which likewise contains some heavy veins of phosphate, and both Hincks and Denholm are rich in asbestos, of a fibre in most cases longer than that of the 'Thetford' Mine, which mine furnished with railway communication is now being worked to much good purpose in the eastern townships. Both contain beds of marketable ochres and other colouring earths Kaolin of the finest kind was observed in several townships fronting on the Gatineau

Of McGill, Bigelow and Bowman I here say little, as these townships are now being explored, and attention will be drawn to them in other reports suffice it here to say that these with Denholm, are the 'locale' of the heaviest and richest belts of phosphate This, with their forests of most valuable woods, gives them prominence, perhaps, over all other townships in importance and value.

Ranges of white crystalline limestone rocks traverse the whole district from north to south and in many instances will yield marbles of the finest texture and most brilliant shades, varying in colour from a decided red to a bright salmon colour, and from blue to dark green

The nature of the rock is, of course, the best possible guarantee for the great value of the soil, from an agricultural point of view The magnificent stretches of hardwood furnish another proof of this well founded theory

Galena in payable quantities has been found in the townships further north, and copper pyrites in various localities.

Probably of the 600,000 acres roughly estimated as the superficies of the rectangle alluded to, 350,000 acres is arable land—this added to the areas before mentioned in the report by the Rev W Percy Chambers, M A , upon the Gatineau Valley

REPORT

—ON—

APATITE-BEARING ROCKS,

BY

MR WILLIAM STUART,

In Ottawa County, Quebec

COMPILED AND ARRANGED BY

A. H. McDOUGALL, B.A. (Tor.)

To C. H. Mackintosh, M.P., *President O. & G. V. R'y*

Sir,—

In conformity with instructions, prospecting has been carried on steadily during the months of October, November and part of December. In carrying on work of this kind in a thinly-settled country and especially late in the autumn many delays and difficulties were to be expected; but we have been singularly well aided, both by the open weather, and by very many residents of the County, who one and all appear to consider the interests of the Company identical with their own. In particular we are indebted to the intelligence and perseverance of our guide Mr. Charles Bigelow, an old and respected resident of Buckingham Township, and well acquainted with the geography of this whole region.

We have endeavoured to arrange the field notes taken in systematic order, by keeping those belonging to the different townships separate; and by giving the descriptions of the lands in the different ranges in their order from south to north. When "shews" on different lots or ranges are seen to belong to the same apatite belt, such connection is mentioned incidentally in the narrative.

TOWNSHIP OF BOWMAN

Range VII.—On lots 2 and 3 there are some well defined shows of green, highly crystalline apatite. The leads in most cases run due north and in some places the width of the vein of pure apatite is three feet. Due north-east from this, apatite is found showing up in four places. The gage rock is mostly felspathic, with some little quartzose gneiss and very little mica.

In crossing lots 4, 5 and 6 apatite is seen to crop out here and there all along until lot 7 is reached, where there are two well defined shows, the gage rock being quartzose gneiss intermixed with orthoclase and pyroxene. Next on lot 8, orthoclase and pyroxene still continuing

apatite was struck in eight places, in one place there being a well defined lead running south. Here there are two small lakes on top of the mountains all around which apatite can be found

There is a belt of apatite bearing rocks running across the west ends of the lots from lot 9 to lot 18. About lot 13, and extending for a distance of about two lots in a heavy belt of crystalline limestone underlining feldspathic gneiss, small pieces of apatite were found, together with bands of pyroxene and mica through the rocks. The rocks on the east ends of these lots (9 to 18) are all apparently apatite-bearing, and that mineral was found there in five or six places.

Near the centre of lots 18 and 19, there is what is known as the "McKenzie Mine." This was very closely examined. On a belt of rock bearing north east from the mine for one fourth of a mile, and about fifty or sixty feet high the mineral apatite shows right up to the top in two distinct places very strong, and in a well-defined shape, the veins appearing to bear north east, and dipping at an angle of about 80°. There have been some tons of phosphate taken from this place, but the mine has been left in very poor shape. The gage rock is feldspathic gneiss, with some pyroxene, mica, and very pure calc spar. The apatite is a rich green, say from 85 to 88 per cent, highly crystalline, but as depth is attained becoming more granular. These lots are apparently of very great value, and should not be disposed of in their present shape, because the "show" could, at small expense, be opened out so as to exhibit very heavily.

A mountain about two hundred feet high runs north-west on the west ends of lots 20, 21 and 22. Apatite shows on this mountain in ten distinct places, beginning at about fifty feet from the bottom and extending right to the top. The apatite is highly crystalline, with rather lightly-colored pyroxene and mica, gage-rock is very close grained feldspathic gneiss. Some one has been here and fired some shots, but they have not worked in the best place. Half of these lots is fine land, bearing good timber.

Following north along west ends of lots as far as lot 32, there is good land, level enough for farming purposes, and bearing fine timber.

Apatite was found on lot 34 near the edge of White Fish Lake, and if this lot were prospected more closely, the mineral would probably be found in larger quantities. From lot 50 to lot 58 the rocks appear to be very rich in apatite, but a close inspection of these lots was not made.

Range VI.—On lot 4 there is a well-defined show. On lot 5 said to be owned by Mr Robertson, of Ottawa, there are two good shows. On west end of lot 6 there is another very good show. Part of each of these three lots is good land, bearing fine cedar. Here and there along the top of mountain, from lot 6 to lot 16, the rocks are partly mixed with apatite, on the top the sediment is so deep that we were unable to get at the solid mineral but it appears to drop down through here to Range V., and the feldspathic and quartzose gneiss is rich—apatite appearing here and there all through. On these lots there is a belt of rock running north-east for about one mile, the average height being about two hundred feet, all quartzose gneiss, intermixed in some cases with orthoclase and specks of apatite. In lots 15, 16 and 17 there is some fine flat farming land, covered with large quantities of good pine and cedar. From lot 18 to lot 24 apatite was not found in paying quantities, but the rocks on 19, 20 and 21

give such indications that there cannot be but heavy phosphate considering the good shows On these lots there are large quantities of good black oak, and on top of mountain, untouched by lumbermen, some fine pine, also some good farming land There is apatite on lots 24, 25 and 26, on lot 25 in three distinct places. On west ends of lots 23 24 and 25, apatite was found with pyroxene and mica on a belt of rocks bearing nearly east and west, with an average height of about twenty feet. The gage rock in some cases flesh-colored spar The apatite can be seen in many places (four of these being very strong shows) together with the head wall, it dips at about 33° north-east In the centre of these lots apatite was found in eight places, the wall rock being very rich micaceous gneiss, but on account of the depth of the sediment, the extent of the apatite-bearing rocks was not ascertained There the gage rock appears to dip or shift into quartzose gneiss, the apatite slightly mixed alongside of pyroxene and mica, forming what is, without doubt a very good formation The land of about half of these lots is good, and bears plenty of pine, cedar and tamarac.

The apatite appears to cross the south halves of Ranges V, VI and VII in three distinct belts—

(1) It strikes first from lot 8 on Range VII, to lot 4 on Range VI

(2) The next strong place is lots 13 or 14, Range VI, and from that it steps down to Range V, making strong for Scaler Lake.

(3) Then from Range VII, lots 18, 19 20 and 21, it steps down in direction east north-east on Range VI, lots 23, 24 and 25, still keeping down through Range V, at back of Lake Rouge

From lot 25 to lot 30 the average half of each lot is, good land From lot 30 to Provision Lake the land is partly rough with some very good timber, the rocks, mostly felds-pathic and quartzose gneiss with beds of pyroxene and mica, showing out here and there From Provision Lake to lot 58 the apatite steps down stronger, and near the north end of Sanlochs Lake it appears to crop out strong and heavy, and in continuous veins of uniform width of 5 feet

Range V.—On lots 6 and 7 running into Scaler Lake, apatite was found with crystalline limestone running for thirty feet, east, and down into the lake The rocks across the lots from 7 to 13 are rich in apatite, and some fine mines will be struck here There are some lots between 7 and 13 supposed to be owned by private individuals, and openings have been made, but we were unable to ascertain the exact numbers of the lots, but we believe it to be all Government land From lot 13 to lot 22 apatite will be found in many places showing up strong and in good shape. There are some very heavy deposits on lots 20, 21 and 22 The next grand stand the apatite makes is on lots 25, 26 and 27, and thence extending to Croche Lake Around here the gneiss rock appears twisted and contorted in many ways, and in some places somewhat discolored, approaching to rust. Heavy deposits of apatite lie around or near here From Croche Lake to the end of the township on this range the land is level, good for farming purposes and heavily covered with timber—the soil generally extremely rich

Range IV.—On this range the formation is such that phosphate cannot be found in paying quantities up as far as lot 50, except that judging from the run of the apatite in Range V something might be expected between lots 29 and 38 on the west ends of the lots From 50 to 58 is a continuation of the fertile valley described in Range V

RANGE III.—The first part of Ranges III and II is very rough and mountainous, mostly hard and tight feldspathic gneiss, with no signs of apatite, all the timber burnt except about two lots of hard wood. The gneiss appears discolored and very dry, with some little crystalline limestone partly mixed in some places with poor and sulphur-colored mica—against apatite at all times.

From lot 48 to lot 58 is a continuation of the above-mentioned fertile valley, low hills bordering it each in the mineral.

RANGE II.—Apatite was found in many places on lots 51 to 58. All the gage rock around here is micaceous gneiss, intersected here and there with heavy beds or bands of pyroxene, mica and highly heated hornblende, mixed with fine samples of very highly crystalline tremolite, the first of this mineral we have seen in this township. In some places iron pyrites can be seen, also the first we have seen in this township, and some signs of the mineral sphene. These lots will turn out well, as the minerals are very dark colored, have been highly heated, and the sheds of the seams are fibrous. There has been a great commotion here, and in three places stands have been made by the conflicting upheaval of minerals.

RANGE I.—Owing to the infiltration made by the minerals in Range II, some of the apatite-bearing rock has jutted out into the back parts of lots 51 to 57 of Range I, in some places it may be found strong, but it does not appear to crop out near the river.

This township is well arranged for drawing the mineral from the mines, many level plains intersecting it, good roads could be easily made, and in some cases shanty roads already exist.

The land, in this township, is of a very good quality for farming purposes, with the exception of the strip along the river, which is very poor, being somewhat light and sandy.

TOWNSHIP OF BIGELOW

RANGE I.—Lots 1 to 6 inclusive, of this range, belong to Ross Brothers. On lots 7, 8 and 9, there is a bluff of rocks about one hundred feet in height, and nearly perpendicular. Here and there along this bluff of micaceous and feldspathic gneiss for one hundred and fifty or two hundred yards we found apatite with mica, pyroxene and crystalline pyroxene. In some places this rock is quartzose gneiss, mixed with pyroxene and mica. These rocks are rich in apatite and the lots are covered with fine hardwood, and a very good quality of basswood. This phosphate belt strikes west to Range II, and through to Bowman.

RANGE II.—We struck apatite mixed with pyroxene, mica and spar in six or seven places, along a ridge running through lot 1. The gage rock is mostly feldspathic, mixed with some very good micaceous gneiss. Good hardwood bush all around here, pine mostly all cut.

On lot 16, about 300 yards from the river, there is a small mountain, say fifty feet in height, extending westward, much discolored with rust. In the east end of it there is a very good lead of apatite running east and west, down side of mountain. In some places where the earth has been scratched off, the apatite can be well seen and is strong, and on south east side of the mountain, and low down near the level land, underneath as it were, this rusty feldspathic gneiss, bands of pale spar and crystalline limestone, bearing east and west, is visible. A strong show could probably be found here, although some of the

mica has rather a silvery appearance Farther west is all apatite bearing rocks, until the back of the rock is reached; these lots are of undoubted value

Lots 27 and 28 are just below the rapids on the Anx Lievres, and we have a water power of magnitude On the opposite side in the township of Wells, the foot of the rapids is closed in by a high range of hills.

Lots 22 and 23 afford the best facilities for landings and sites, there being a trail from them out to the Government road.

Lots 29 and 30, Range II together with lots 29 and 30, Range I, in the township of Wells, embrace the rapid "De Croche" The fall here is about twelve or fifteen feet, affording another very valuable water power

Lots 44 and 45, Range III together with lots 44 and 45, Range A of Wells, contain the Iroquois Rapids which extend for about two hundred and fifty yards along the river with a fall of about twelve feet There are numerous water powers of lesser magnitude Hardwood in abundance

Range III —We struck apatite in rather a faint shape on lot 14 Keeping west and south west, to White Fish Lake, the rocks are all apatite bearing but the sediment is deep, and only in places can the rock be seen Explorations will undoubtedly pay here From lot 1 to lot 12, the land is level, good for farming, and has very fine timber

With reference to Ranges II and III from lot 25 to 35, between Lac-eau and the river, on lot 34, Range II a view of calc spar was found, a little discolored highly crystalline and pure The vein is about one foot wide, with eight inches of same substance on hard wall side heavily mixed with mica of a very dark and sooty appearance This vein or lead runs due east and dips about north-east, say 33°, and can be traced many hundreds of feet down to the lake, and out to the river These calc spar veins are important at all times as leads for many minerals, so from such indications as these we struck south west Near the centre of lots 25 and 26, Ranges II and III, ridges of foldspathic and quartzose gneiss bear mostly due east and west in a well defined shape, about twenty to twenty five feet in width The south side of each ridge is vertical from four to six feet and straight for hundreds of feet in some cases, with at intervals, square heads dipping west at about 80°, showing that the drift or current from east to west, was sharp and far underground, leaving little or no chance for us to get at the apatite although the rocks have an apatite-bearing appearance Getting back into the west ends of lots on Range III we struck due north across lots to 33, finding only pockets of apatite, the rocks continuing much the same The current lies here at a greater depth than any which has been yet observed in the Ottawa locality, and until by means of diamond drills, series of holes have been put down to from six hundred to two thousand feet, to see or reach the dead rock anything more said by us at this time about this subject, will appear as idle speculation But until such times as the dead rock is reached we make bold to say that far below any of the depths mentioned here, apatite will and can be found, and further state that until such depths have been gone down to, by some party or parties, mining for apatite will not begin to pay the holders of these claims This current must have carried along the calc spar and pyroxene (as no signs of them could be found on the surface) until some strong wall of gneiss

trap has forced them up. Here is our only chance of finding the minerals mentioned.

Ascending lot 41, Range III, up mountain which is part of a high ridge (say three hundred feet above lake) after getting up and over the top, we struck west above lake as far as west end of lot 39, Range IV, then north-east as far as lots 45 in Ranges III and IV, then south to river, finding only shews of apatite. This ridge is too tight, solid and dry for any chance of finding apatite in large quantities or decided veins.

Finally in the Township of Bigelow, we recommend that Ranges III and IV be further explored from lot 45 to lot 54, and Range V from lot 18 to lot 54, no part of which has been travelled minutely, but on which we believe phosphate can be found in good quantity, the indications being good.

TOWNSHIP OF WELLS.

We next prospected from lot 8, Range II, up the west side of River des Ours, to lot 13, and from 13 crossed over to 18. Near the centre of lots 15 and 16, Range III, the apatite crops out strong in over twenty places, there being some magnificent shows in well defined veins. The gage rock is feldspathic gneiss, very much discolored with rust, partly oxide of iron and magnesia, but as depth is reached the rust will disappear from the apatite. The apatite here is of a bright bluish color, highly crystalline and very fine (say 88 per cent.). The ridge or belt of rocks is very high, much contorted, twisted and broken up; there appears to have been some violent upheavals here. We went over this place very carefully, and are able to state that this belt of apatite came across River des Ours from lots 16, 17 and 18, on Range IV very faint. We carefully looked up the bed of the river, as the water was very low; bottom rock micaceous gneiss, fine-grained, rather hard, dipping clear north at about 33°. Above gneiss in bed of river there is crystalline limestone in heavy beds for about one-quarter mile north west, the mountain rising very abruptly. Here quartzose gneiss in bands dipping partly north, say fifty feet high, and here and there heavy beds or bands of pyroxene and mica mixed. Then for one-half mile west the gneiss begins to shew rust and feldspathic and the apatite crops out well, and as we have said before, strong and in grand shape down into a small lake and still going west for half a mile more the gneiss is black from great heat, and is mixed with tourmal no compact and massive, tremolite, hornblend and we think some sphene. This brings us down to Range II. In many places rocks partly phosphate were found along top of mountain. In one place there is a loose stone—say ton tons in weight—partly quartzose gneiss, which singular to say does not appear to belong to this formation. From here the apatite appears to dip and strike right across the river to Bigelow lots 7, 8 and 9, Range I. On lots 8 and 9, Range II of Wells, there is not much if any, apatite but fronting as they do, the two rivers, we consider they must become valuable for hauling and wharfage. Some of these apatite-bearing rocks were first found by lumbermen.

There is a series of rapids on the Des Ours River extending for about three hundred yards through the lots recommended, the total fall being probably about sixteen feet. This would give a first-class water power, in fact at one point a head of ten feet could be very

easily maintained the whole year. All kinds of hardwood abound. At the north-east and south-east sides of two of Mr James MacCabe's lots we partly overhauled two very large apatite-bearing mountains, and dug up ten or fifteen pounds of that mineral. The gage-rock all around here is feldspathic gneiss, with heavy beds or bands of pyroxene, and half mica and apatite mixed, showing out in every conceivable shape on surface, and much charged with rust. We may say that what we saw here, if properly worked will be found to be a mine of wealth, and will satisfy any reasonable mining operator.

To conclude, this township, as far as our information goes, we believe that phosphate may be found crossing from lots 16, 17 and 18, Range I of this township into Bigelow, and that it can be seen near the bank of the river Aux Lievres, but we are unable to give definite information. The eastern side of this township should be further explored and thoroughly, and if apatite is found there in paying quantities, the explorations should then be pushed still further eastward, to find, if possible, the whole length of this belt.

As far as we have seen in Wells, up to lot 36 the land is only fair for farming purposes, but above that it becomes heavier and more fertile as we near the end of the township.

General Notes on the Apatite-bearing Belts and Rocks in the Ottawa Region

From a mining point, what we term a belt is a current which must have travelled from east to west, and in so doing, where heavy walls or dikes of gneiss were met with the apatite made for the surface in conjunction with other minerals until a clearance had been effected. These surface shows are the mines of the present day. In some cases the mineral took side spurts off this belt, both north and south until the clearance above mentioned was effected.

In travelling through Bowman, from west to east these belts are found to strike strongly from Range VII into Denholm in the following places. From lots 2 and 3, from lots 7 and 8, from lots 18, 19, 20 and 21. There is also a belt striking across from lots 24 and 25 and farther north east, in Range VII, up to White Fish Lake, the land being nearly level, and in the line of the belt, the mineral must have dipped below, and our explorations tend to prove this theory.

Again from lots A and B, Range V of Bowman, down through Range IV to the High Falls some very strange and peculiar upheavals may be noted. This belt here appears to have been pushed or pinched south close down to bottom of the falls in Portland West. Over the river in west end of Villeneuve, there are no signs of apatite for three miles back, all the rocks have suffered much from below, are blackened from great heat and partly rust coloured, and in some cases the gneiss is partly mica of a sooty appearance. No apatite could have been formed here near the surface. We recommend that the east end of Villeneuve be again explored by parties and if large deposits of apatite are found, these leads or belts should be followed up both east and west, until the whole township has been traversed. We are not at present able to make any safe statements regarding the resources of this township, neither as to the number of the belts nor what their

extent may be Judging from present knowledge, the apatite-bearing belts of great depth and richness (if fairly put to test) lie between the Gatineau and Aux Lievres rivers from Buckingham, Templeton and Hull, up to front of White Fish Lake A little below White Fish Lake this apatite-bearing formation widens out both east and west and will be found to strike strong from Lake des Ours west to the Gatineau These statements are founded on reliable information, and we regret that we have not been enabled, for want of time, to put them to a real test this fall, however a party should be sent out in the spring to extend the amount of information already obtained

In conclusion we would say that mining capitalists should procure diamond drills and start a series of borings in the various townships and at different angles, so as to arrive at as it were the average thickness as well as the depth of the veins of these great phosphate belts in Ottawa County This is necessary in such an enterprising and progressive age as the present if we wish to fully develop this branch of industry to obtain good returns for the amounts of capital invested

In the methods of mining great improvements can yet be made. The antiquated methods should be laid aside, and steam drills, batteries, and compressed air, when required, should be brought into use One steam drill will, in good hands, in an open pit, do the work of fully eighteen men, and in a drift much more

We are of opinion that little profit will accrue to the individual enterprise There are thousands of lots upon which phosphate exists, but the great mines are few, and can only be successfully worked by companies having approved and modern appliances, including for development with certain results, the diamond drills, &c., before-mentioned Above Wells, Bigelow and McGill we know little, but we are inclined to the opinion that Denholm and the country north of the townships above mentioned, will prove of great interest, the indications noticed by some of our party and the reports current, tend to mark that region even more prominently as the phosphate region *par excellence*, but it is more than likely that the mineral will be found at greater depth and with generally less mountainous and ordinary surface indication In running these explorations next year the townships of Denholm, Hincks Cameron and Blake northward should be taken up and for the reasons hereinbefore outlined

Before concluding we would impress upon you the importance and value of the timber in the district visited, comprising maple, cedar, tamarac oaks hemlock beech birch, basswood and the usual pines. In the area traversed at least 2 or 3 million ties for railway purposes may be had, and the other timbers for trestling, culverting, &c, &c is there likewise in great quantity The hemlock and oak bark alone would in themselves create a large and profitable business The lakes visited are teeming with fish, and mink, muskrat, beaver, marten, and large and small game appear to be plentiful

OTTAWA CITY AND JAMES' BAY

The Ottawa and Gatineau Valley Railroad Company, in addition to the early construction of their main line, have in contemplation the prosecution of an extensive exploratory survey from the Desert River, the present terminus of the road to James' Bay, the distance from Ottawa to the Bay by the Hurricanaw River route being about 450 miles, and acknowledged to be not only the most direct, but easiest of construction, whilst traversing a line of country full of valuable minerals of a highly merchantable character and offering an inviting field for the capitalist and farmer, second to none on the continent.

Not many years since the great North western prairies, now the marvel of the world for their wonderful fertility and extraordinary production of grain, were a *terra incognita* to the general public, and were given up in the popular imagination to howling desolation and perpetual frost. The opinion entertained of them is very generally held to-day regarding the large and more southern region, comprising 60,000 square miles, situated between James' Bay and the Height of Land north of Lakes Superior and Huron. Yet the constantly accumulating facts are likely to prove that this northern heritage of Ontario is exceedingly valuable for lumbering and mining resources, and capable of sustaining a very considerable agricultural population. The recent geological surveys demonstrate that a most valuable mineral region lies within and beyond it, that the dense forests which cover it contain a very large amount of valuable timber which can easily be floated down the magnificent rivers—several of them each over 300 miles in length—which traverse the region, that the surface unlike that of the Ottawa, Muskoka and Algoma districts, is almost nul reken by lakes, and only occasionally by rocks; and that south and south west of James' Bay, at some distance inland, a fertile belt, well adapted for agriculture exists, which, when the mineral and forest wealth of the country is being turned to account will be an inviting field for the farmer.

COAL AND IRON MINES.

It is exceedingly gratifying to learn from Prof. Bell's recently published report that around James' Bay and up to the eastern side of Hudson Bay he great deposits of iron and coal lie close together that with the cheap water freights which the region may afford the district along James' Bay may yet become another Pennsylvania. Prof. Bell after referring to the soil, climate and forests of the district, says "Minerals may, however, become in the future the greatest of the resources of the shores of Hudson Bay. Little direct search has yet been made for the valuable minerals of these regions. In 1875 I found a large deposit of rich magnetic on the Mattagami River. In 1877 inexhaustible supplies of good manganiferous iron ore were discovered on the islands near the East Main coast (that is the coast along the eastern shore of James' and Hudson Bays) and promising quantities of galena around Richmond Gulf and also near Whale River. Traces of gold, silver, molybdenum and copper were likewise noted on the

East Main coast. Lignite was met with on the Missinaipi (a branch of the Moose), gypsum on the Moose, and petroleum-bearing limestone on the Abittibi River (another tributary of the Moose)." Another explorer, referring to the great iron, coal and other minerals of the neighborhood of James' Bay, says: "I have no hesitation in pronouncing this district the richest mineral region in the Dominion; perhaps on the continent." Anthracite and iron are found along the rivers south of James' Bay, a gigantic outcropping, containing over 25 per cent. of pure iron ore, displaying itself along the Moose, and a magnetic island on the Abittibi, rendering the surveyor's compass useless. To Ontario this immense mineral wealth is likely to yet prove an important factor in her prosperity, particularly as Moose Fort is only 500 miles from Toronto and on the completion of the connecting link the Calendar near Lake Nipissing, a Moose Factory Branch over 300 miles long, from near Nipissing, or a branch only 200 miles long from near Nepigon will, with the Pacific Railway, furnish a short route to the shores of James' Bay.

THE GREAT NORTHERN FOREST.

The great forest which bounds Hudson Bay on the east and extends up the interior of East Main and Labrador to Ungava Bay and Hudson Straits, six hundred miles north of Moose Factory, attains its greatest characteristic, developing just south of James' Bay, which lies nearly midway between the northern and southern limits of the peculiar trees which compose the great northern woods. Some trees such as the Banksian pine and the spruce, which along their southern limits in Central Ontario are almost valueless commercially, here become giants of the forest and are valuable for timber. The list of trees which flourish at James' Bay or in its drainage basin includes according to Prof. Bell, the spruce (two feet or more in diameter), the tamarac, balsam, poplar (luxurian), Banksian pine, silver fir, arbor vitæ, elm, white pine and red pine, and of lesser importance the poplar, mountain ash and mountain maple. As James' Bay is as near to Liverpool as is Quebec, the future of the district as a lumbering country looks hopeful.

WARMER THAN NORTH WEST WHEAT LAND.

Such being the great wealth of mine and forest which is likely to be developed some day, the question arises,—are climate conditions sufficiently favorable for the agriculture which will be necessary to sustain the large population which may flock to James' Bay territory? Prof. Bell who has spent thirteen summers around Hudson Bay, thinks they are. Testimony comes from other reliable sources to similar effect; casual experiments in wheat-growing have succeeded at some localities. Moose Factory, at the extreme north of the Moose drainage basin, is in latitude 51 16 the same as the Qu'Appelle Valley, and further south than Battleford. Its winters are not colder than those of Manitoba generally, and are warmer than the Athabaska and Peace River countries. The average temperature for the year (38 8) is higher than that of many parts of the best wheat-growing lands of the North West, and less than four degrees colder than that of Winnipeg—a difference chiefly perceptible in early spring. The southern part of the James' Bay district is further south than Manitoba and on the same latitude as districts in Quebec, where wheat and even Indian corn are grown every year. The "fertile belt" of the district is a gently undulating plain, with a sandy loam soil, and lies in the same latitude as Winnipeg.

If wheat in Manitoba is an assured success every year, it is reasonable to suppose that James' Bay district, with its large area of fertile soil, cannot be without agricultural value

The scantiness of the population has prevented agriculture being tried Fortunately at one point—Moose Fort—but on a "low wet, clayey soil, exposed to icy winds," a careful record has been kept for several years, and it furnishes a test of climate much superior to that which casual experiments in agriculture would afford The figures and comparisons given hereafter are chiefly compiled from the three latest meteorological reports, and embrace the years 1878 79-80 a sufficiently long period to exclude the possibility of much mistake regarding the general characteristics of the climate.

WINTER AT ST JAMES BAY.

The winter usually begins in the early part of November, but sometimes not until the third week November and December are snowy months, but after New Year's, excepting in one year when January was snowy, the snowfall has not exceeded a few inches The total snowfall is much the same as Toronto, although a greater depth is on the ground at one time. Rain is rare in midwinter although not unknown. The mean temperature of December, January, and February is 0 1 while that of Winnipeg is 1 3, or little more than two degrees warmer The mean of Dunvegan in the celebrated Peace River country is 7 5 below zero, or nearly eight degrees colder than Moose Factory In extreme temperatures Moose Factory is not so cold as Winnipeg the lowest being 45 below zero while Winnipeg shows 47 below Dunvegan registered 63 below zero in 1880 As excessive temperatures as Moose Fort knows, are recorded in the colder settled parts of Ontario

THE NORTH WINDS OF SPRING

In March occasional temperatures of 45 to 50 above zero indicate the approach of spring In the early part of April the ground becomes bare but the weather is exceedingly disagreeable and variable until near the middle of May cold winds and warm winds rapidly alternating This is due to the fact that James Bay being exceedingly shallow, except in the deep central portion, freezes almost over its whole width—150 miles—and northward to its junction with the deep open waters of Hudson Bay presenting in this respect an analogy to the northern end of the Caspian Sea. The ice in spring remains and melts in the bay, and the cold air arising from it is drawn southward by the greater heat of the Moose River basin North winds are thus the prevalent winds during April, May and June In this respect the immediate neighbourhood of the bay resembles Cape Breton, and several other parts of the Maritime Provinces where spring is retarded to an almost similar degree by the cold winds from the icy current flowing down the coasts. In May Moose Factory is 4 degrees cooler than Prince Arthur's Landing, but inland, where the cold north winds have lost their force this month, like the rest of the spring is warmer Gardening at the Fort begins about the middle of May, and the last severe night frosts occur before the month is over, and temperatures of nearly 80 in the shade are sometimes reached

WARMER SUMMER THAN EDINBURGH

Summer may be said to begin with June although the freezing point is touched about the beginning of this month in most years as it is in the North West, and in several parts of Ontario not far from Toronto. The summers at the Fort are not so warm as fifty and a hundred miles inland, and are cooler in June, July and August than at Winnipeg and in many parts of the North West, but warmer than at other North Western district, or at Edinburgh, Scotland.

The following table shows the mean temperature at various places, and will prove interesting for comparisons. The foreign stations are from Blodgett; all the Canadian stations, excepting Edmonton and Forth Saskatchewan show the mean not in one year but in three—1878 79 80—and may be taken to represent the usual summer climate.

	June	July	August	Mean
	DEG	DEG	DEG	DEG
Moose Fort	54 0	62 0	58 5	58 2
San Francisco	58 8	57 0	62 2	59 6
Edinburgh	56 0	58 7	56 8	57 2
London, England	58 7	62 4	62 1	61 1
Wick, Scotland				54 0
Truro, N S	57 1	62 8	62 5	60 8
Prince Arthur's Landing	56 9	64 8	63 1	61 6
Beatrice, Muskoka	59 5	65 7	61 8	63 3
Winnipeg	63 9	67 5	63 9	65 1
Edmonton			54 4	
Fort Saskatchewan			56 8	
Toronto	63 3	69 4	66 9	67 5
Windsor	67 5	73 7	71 0	70 7

THE LIMIT OF PROFITABLE WHEAT FARMING

Wheat requires for its ripening in Scotland a mean temperature for three months of at least 55 degrees, and in the interior of continents a temperature a few degrees higher so as to counter balance the effects of the chiller-nights occasionally experienced inland. It would, therefore, appear that although wheat would easily ripen and produce a good crop some years at Moose Fort, the mean temperature of the place might render it a rather precarious and not very profitable crop. Moose Factory however is surrounded by a low, wet, cold, clayey soil, and exposed as well to the cold winds from the bay. Beyond doubt the inlands valleys with their warmer soil have a temperature in many localities as favourable for wheat growing as some parts of England and Scotland where it is a staple crop.

OATS AND BARLEY CERTAIN CROPS

The average temperature required for wheat is at least five degrees greater than is required for barley and oats. These crops succeed far up the Mackenzie river, beyond the Arctic circle in Norway, and in the northern counties of Scotland where the summer mean is only 52° to 54°, and the month of June is sometimes as low as 48°, or 6° lower

than at Moose Factory Oats appear to be as sensitive to frost as wheat and if it can be shown that the climate of Moose Factory compares well in exemption from frosts with localities where oats succeed well, the general high temperature of the summer months will guarantee the full success of the oat and barley crops in the James' Bay region where over a proper style of farming is pursued.

CONTINUOUS EXEMPTION FROM FROST

Taking the average dates of the occurrence of the last temperature of 32 in spring and the first fall to the freezing point in the close of summer, we find the following to be the average periods of continuous exemption from black frost for the three years 1878-80 —

	Last 32 deg	First 32 deg	Continuous Exemption
Moose Fort	June 6	Sept 26	112 days
Winnipeg	May 14	Sept. 15	120 "
Prince Arthur's Landing	June 2	Sept. 13	101 "
Beatrice, Ont	June 6	Sept. 7	93 "
Pembroke, Ont	May 15	Sept 28	136 "
Hamilton, Ont	Apr 17	Oct 20	186 "

From this it will be seen that Hamilton and Pembroke far excel Winnipeg in exemption from damaging frosts, yet the exemption at the Prairie Capital allows of the growth of not only oats, barley, and wheat but even of Indian corn Beatrice, Muskoka, grows with profit all the grains excepting corn yet it has a continuous period of exemption from frost nineteen days shorter than Moose Factory Even Winnipeg exceeds the Fort only eight days It is interesting to note that the celebrated grain district around Woodstock Ontario, experienced a temperature lower than 32° on June 6th, 1878, and June 7th 1879 or quite as late as the average date at Moose Factory It will be noticed, too, while owing to the neighborhood of melting ice and cold water at James' Bay the last frost of spring is later than in Winnipeg or the Ottawa region it is no later than in Muskoka while the first black frost of autumn occurs on the cold, wet clayey soil of Moose Factory not till the end of September, nineteen days later than in Muskoka and eleven days later than at Winnipeg The long frostless period at Pembroke compared with the shorter season farther south suggests that on warm soils inland from James' Bay the frostless season may be even longer than at Moose Factory

When the lowest temperature of the summer months are compared the result is equally favourably to James' Bay Thus while the average lowest reached between the 1st of June and 1st of October at Moose Factory is only 29 2 or less than three degrees below the freezing point Beatrice, Muskoka, shows 28 in June and 27 in September In July and August the average coolest is 40 or quite as high as in many parts of Ontario, and higher than in most parts of the North West. The absolutely lowest reached in the same months in the three years was 27 at Moose Factory, while Truro, N. S., Muskoka, Prince

Arthur's Landing Fort Calgary Dunvegan and Edmonton, all were decidedly lower In Muskoka and at Edmonton black frost occurred in August, and at Fort Calgary every month during the season 1880 Moose Fort had no frost any year before the middle of September In the central countries of England last August 32.5 was reached in districts where wheat is a staple crop, while in the north of Scotland hard frosts are sometimes known in midsummer, though oats and barley are grown extensively The facts stated prove that for at least oats and barley the climate of even the northern part of the vast Moose River basin is admirably suitable, and they indicate that even wheat cultivation may be found practicable on warmer soils inland

Hot waves are as frequent and almost as intense as at Toronto The average highest in May is 75°, in July 88°, in October 74° The average highest in Toronto in July is only 91°, and in October is 68°, or five degrees less than James' Bay Evidently our supposed hyperboreans have occasion to know the value of ice cream

If the cold waters of James' Bay retard the Moose Factory spring, they make compensation in autumn by protecting the coast from the cold northern blasts, and by prolonging the genial fall weather In fact the shores of the Bay enjoy

A MILDER AUTUMN THAN MANITOBA,

or any part of the North West, excepting Fort Macleod The first light hoar frost at Moose Factory occurs not till about the 5th of September, and the first genuine frost not till the end of the month, or quite as late as in most parts of Ontario In October the days are genial and occasionally decidedly warm and the night frosts at the end of the month not so severe as at Winnipeg The beginning of November is usually mild, but as the month wears on towards the middle winter sets in with snows, sometimes heavy and the thermometer dips towards zero. Before the month is over the river is generally frozen, and the winter, which is much brighter than in Toronto fully sets in

High temperatures in the fall months are not uncommon The average maximum for October is higher than at Toronto and in 1879 was actually up to 81° 8, or higher than has been known in a Toronto October in forty years.

The following table shows the mean temperature of autumn —

		Sept	Oct	Nov
		DEG	DEG	DEG
Moose Fort,	3 years	58 9	41 3	21 8
Winnipeg,	3 "	50 8	38 9	21 3
Battleford	2 "	46 9	33 2	19 8
Fort Macleod,	3 "	54 6	40 9	27 2
Fort Calgary,	1880	47 2	36 1	
Fort Edmonton,	1880	58 4	41 2	20 5
Dunvegan	1880	46 6	39 3	19 0
Toronto,	3 years	59 1	49 7	34 1
Windsor,	3 "	62 0	53 6	36 0

The figures presented furnish unequivocal testimony to the suitability of the climate of much of the James' Bay district for barley, oats, and various other staple crops

If casual experiments at some points have failed, the cause may be found in ignorance or carelessness in conducting them Of several hundred farmers at Edmonton, only a few took the precaution to sow their wheat early in the spring of 1881, those reaped good crops in good condition and comparatively early, although the summer was cold, wet, and backward, the others (not practical farmers) who allowed their opportunities to slip by unimproved had a late harvest and poor crops Similar ignorance or neglect will produce similar results in all northern climates where the season, while amply repaying proper farming, leaves little spare time in the warmer months to those who postpone ploughing or sowing a fortnight or so later than it can first be done

GRAIN AND OTHER VEGETABLES GROWN

The evidence of the agricultural capacity of the James' Bay country, derived from actual cultivation is necessarily very meagre, but is on the whole encouraging Wheat succeeds at Lake Temiscamingue, near the south-eastern borders Prof Bell when three hundred miles north of Lake Nipissing was surprised by finding a Scotch farmer settled there for several years installed comfortably in the midst of a forty acre clearing, and cultivating oats, barley, turnips potatoes, and other vegetables to sell to Hudson Bay traders and Indians. The farmer had sowed wheat one year for an experiment and it ripened well As there was no mill he had not attempted wheat as a regular crop This farm is about 100 miles from James Bay

Mr George Gladman, who resided at Moose Fort for fifteen years, says the climate and soil there are good, potatoes and vegetables were raised in abundance, barley ripened well, currants gooseberries, strawberries and raspberries are plentiful—wheat had not been tried—horned cattle horses, pigs and sheep throve Last century Mr Frost, who resided at the Fort for many years stated in a book published by him that barley, peas, and beans succeeded well, "although exposed to the chilling winds which came from the ice on the bay" In another book he says —"Sown wheat has stood the winter frosts and grown very well the summer following, and black cherries also have grown and borne fruit." Mr Edward Thompson for three years surgeon at Moose Fort, says he has seen fa

BETTER BARLEY AND OATS AT MOOSE RIVER

than he ever saw in the Orkneys, but the quantity sown was small "There was ground enough broke for corn (grain), but never any encouragment given for sowing it but the reverse the Governor forbidding it for no other reason than that if corn (grain) had been sown, a colony would soon have been erected there" Prof Bell, in the latest of his reports which has come to hand, speaks very highly of the country for grazing and dairying Besides its cultivated grasses it produces in some parts, particularly on the south-west and western shores of the Bay, near Fort Albany, 60 miles further north than Moose Factory, immense quantities of wild hay At Moose Factory oats, barley, beans peas, turnips beets, carrots, cabbages, and onions

are cultivated with perfect ease, while even the tropical tomato succeeds As the soil and peculiar exposure of Moose Factory are unfavourable, the fact of this success augurs well for the future agricultural development of the more southern country inland That all the flora is the same as that around Quebec is cited by Prof Bell as a proof of the mildness of the climate

Finally, Mr Alonzo Wright, M P, who is, perhaps, more conversant with all these facts than any other gentleman in Canada, has stated his views very ably in respect of this northern region—indulging in no theories—in his speeches in Parliament the honorable member distinctly says there is a territory there

BEYOND THE HEIGHT OF LAND,

capable of affording homes for millions of people and Thomas Keefer, Esq, C E gives it as his opinion that the mineral resources of the district as a whole are the most promising of any portion of Canada Therefore under these and all the circumstances herein set forth, I respectfully submit the same for the earnest consideration of the Government, and in order that the extent and variety of the actual resources may be no longer in doubt, some appropriation be made to enable a thorough and practical exploratory survey to be undertaken without delay

J MURRAY MITCHELL, C E

Engineer-in-Chief

O & G V & O C Railways

OTTAWA, Dec 5 1882

Notes on some of the Minerals of the Gatineau District.

IRON.—That this metal exists in large quantities is evident to every one who has examined the rocks. In many parts the quartzose rocks are so stained with the peroxide, that they might be taken for masses of red hematite. In other parts masses of ironstone are exposed on the sides of the lakes. In others veins of iron are found in the rocks. The horizon in which the beds of magnetite appear extend from Hull northwards to the Big Lake. The deposit at Hull is not only noted for its extent, but also for its superior quality and purity. Besides these deposits of magnetite, iron sand in large beds, and hematite is found in Maniwaki—at present an Indian reserve, but which, it is expected, the Government will soon throw open to settlement, removing the Red men further to the north.

APATITE OR PHOSPHATE OF LIME.—The County of Ottawa has for some time provided a great part of this important mineral shipped from Canada. The quantity found all through the district between the Gatineau and Lievre is immense, and will be wonderfully developed when the two branches of the railway are completed. In some parts the phosphate is seen in the rocks through which the roads are cut; in other places as near the mouth of Post Creek on the Gatineau, as shingle on the river bank. In Buckingham it is found in large beds, and filling cavities in the limestone rocks. It is quarried in many townships, and proving very remunerative large prices are given for lands known to contain it. That there will always be a large demand for Phosphate may be seen from the fact that immense quantities of phosphoric acid are every year taken out of the earth in wheat and other crops. The want of this phosphoric acid is considered in a great measure, the cause of the comparative sterility of many lands in which large crops of wheat were formerly grown. From calculations made in 1870* it is shown that the shipments of cereals and pulse from Montreal in the previous year represented the large quantity of 2574 6 tons of phosphoric acid, of a money value of $530,191. The export of wheat from British America was only 7½ per cent of the total amount received by England in the shape of wheat alone, which altogether, therefore, represents an amount of no less than 31,200 tons of phosphoric acid, of the value of $6,400,400 annually. What an immense amount, therefore of Phosphate of Lime is required every year to restore to the earth this large quantity of so important an ingredient.

GRAPHITE OR PLUMBAGO is in large quantities in Lochaber and Buckingham sometimes in beds of good material, at other times disseminated, yet in paying quantities, and sometimes in lumps of the purest metal. Some of the material analysed by Dr Harrington of the Geological Survey, was found to compare very favorably with the best qualities imported from Ceylon. The use of this mineral is continually increasing. At present it is employed very extensively for writing pencils, for electrotyping purposes, for crucibles, for blacking stoves and as a lubricant, so that there is always a good demand for it.

*Canadian Naturalist vol V, p 245

Galena, the most common ore of Lead is found in many places in this County. Sometimes it is of so soft a nature that it can be cut into shape by a knife. It is in some quantity above Desert Village and at the N E of White Fish Lake, near the Big Lake, and in many localities in the Gatineau Valley. In Blake a vein was traced for more than 100 feet. This ore is very often argentiferous, and a specimen from the Big Lake, when analysed, was proved to contain a good per centage of silver.

Molybdenum.—This scarce, but useful metal is employed extensively in calico printing as a mordant and in giving to silk some very beautiful dyes. It has been shown by different chemists that by the action of different chemicals, it may be made to yield a great variety of fine coloring materials. As it has hitherto been found in only a few places it brings as much as $1 00 per lb. As the production increases and it becomes somewhat cheaper, the demand will also increase, and a remunerative business may be expected. It exists in some quantity in many townships, particularly in Hull.

Pottery Clay and Kaolin, or China Clay.—From the large number of feldspathic rocks in Canada, one would expect that large quantities of the material so important to the potter, would be found in the country. Such however, is not the case. The feldspars have too much iron in them for the manufacturer, and the few potteries in the Province have to import their material, generally in the form of pegmatite rock from Cornwall and Devonshire. In many places up the Gatineau, at Hull, Aylwin, Wright, Cameron, etc., a very pure kind of white orthoclase is to be found, apparently suitable for this work, and if mined and put into the market will, perhaps prove a great benefit to the trade.

Kaolin or China Clay for the manufacture of fine porcelain and useful for many other purposes in the arts, has recently been found on the Aux Lievres in immense beds.*

Mica.—Although the Laurentian rocks abound with Mica it is generally of such a dark color, or of such small size as to be of little value. In the western part of this County, I have seen very large plates of white mica above 10 inches square. Although they were not of first quality as regards clearness and transparency, being taken off the outside of crystals exposed on the river bank, they give great promise of good material when the outside sheets are removed. This useful mineral is in great demand, and obtains as much as $8 per lb. for good size sheets of first quality.

Asbestos.—Among the many minerals found in the County of Ottawa, perhaps none are more remarkable than the veins of Asbestos found in Wakefield, Denholm and on the line of Ottawa and Pontiac Counties. This material has only lately been brought into notice as of economical value. Specimens of this rock fibre were found some years since in Canada, but the brittleness, and the coarseness of the fibre gave little promise of its becoming of any use. Of late years it has been found purer in composition, and so much finer in structure that the greatest skill has been employed to devise machinery to bring it into use. These efforts have been successful, and the fibre has been

* Since the above was written Kaolin in many places in the Townships of Blake, McGill, Wabasse and Dudley has been found and of a merchantable character.

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span and woven into a fabric upon which the fiercest flame has no power. It has also been formed into a kind of cardboard, into lamp wicks, ropes and packing for the piston rods of steam engines, and a coating for steam pipes, for which it is well suited, being an excellent non-conductor of heat. It may be seen that the processes already employed only require development to make this a very important and remunerative manufacture. With improved machinery and experience, finer cloths may be made, forming incombustible clothing for those exposed to flame or intense heat. It is intended also to apply metallic dyes, much ingrained by heat and so form not only an incombustible, but also an elegant fabric, which may be the means of saving much life and property. It would be impossible to mention the many useful purposes to which Asbestos may be employed, hearth rugs, table covers, hangings, drapery, may be suggested. Its remarkable power as a non-conductor of heat will render the thick cardboard, when covered with a good design, an elegant guard to save our woodwork from the heat of our stoves. Elegantly dyed cords and tassels of Asbestos would be a great improvement on the unsightly wires which retain our stove pipes in halls and public rooms. Again, the necessity of defending our water pipes from the destructive influence of the frost, points to the necessity for a non-conducting substance, which will prevent the heat being abstracted. It is also now used extensively in the manufacture of paints. The Asbestos found in Ottawa County is remarkable for the great length of fibre, and will no doubt be much sought for.

Serpentine and Marble.—Serpentine has been found in the valley of the Aux Lievres, and at Desert Village. Some of the white crystalline limestones are of so fine a texture as to form a valuable statuary marble. Some of the coarser crystalline limestones appear so compact that they would no doubt bear a fine polish. At Desert Village is a church, built of the stone of the country, a very close, white limestone, which has just sufficient color in it to make it pleasant and agreeable to the eye, and of a texture so hard as apparently to defy all the destructive powers of time and weather. A handsome green veined Marble is also found in Denholm.

Coloring Earths.—Chiefly ochres (Hydrous Peroxides of Iron) are found in many of the Townships on the Gatineau, notably in Wright, Low and Denholm. They are found in a state requiring very little outlay to render them fit for use and are of all shades of color, from a light grey to dark red. At the present time such ochres are saleable at good prices.

Barytes is also found pretty plentifully between the Gatineau and Aux Lievres Rivers. It is used as a white paint, and after some preparation, forms the permanent white of the artist. It is also used as an adulteration to white lead.

Iron Pyrites is said to exist in very large quantities in Wright and several others townships. No doubt this will in time be put to use, as is done at Elizabethtown, in Ontario, in the manufacture of green copperas and of sulphuric acid, which might here be employed in reducing the native apatite to a form suitable to the wants of the farmer. This ferric sulphide often contains some small percentage of cobalt and nickel, which, by improved methods may be profitably extracted.

The Forests of Ottawa County

Ottawa County has for a long time been looked upon as one of the principal lumbering districts of Canada. The valleys of the Gatineau and the Aux Lievres, hold the chief places for this important industry. For several years their woods have furnished a large amount of the white and red pine produced. As soon as the rivers are open in the Spring the logs which have been cut during the winter, begin their journey upon their swift waters and down the numerous rapids, till about the end of September, when the booms, towards the lower parts of the rivers, have arrested them in their course, and hundreds of thousands of logs are enclosed, waiting to be sorted and forwarded to their owners. The lower parts of the County, through which these rivers flow, have been partly cleared of the largest pine and basswood, but thousands of smaller trees have been left, which are rapidly growing up, and many good sized trees still remain. The hardwood, has scarcely been touched, as it is too heavy to be floated, and there has been no railroad to take it to a market.

In the Valley of the Aux Lievres there still remain whole forests of tamarack, resembling the European larch, and much used in shipbuilding, hemlock, birch beech, oak, elm, cedar and a good sprinkling of white walnut or butternut. From this part along, more than sufficient timber to build both railroads (The Gatineau and Aux Lievres R. R.) can be provided, and with that in the Gatineau Valley give an immense quantity for exportation, as well as supplying all home and manufacturing requirements. The Railway will open a large market for all that can be spared. Even the smaller trees and timber unfit for other uses will find ready sale as cordwood. The hemlock is useful for railway ties and many other purposes. Its bark is in great demand by the tanners, and now that the supply of black walnut is nearly exhausted, the butternut and birch will be much sought for and bring good prices. Cedar, of which large quantities still remain throughout the whole district, will always find a good sale also. The ease with which it can be made into shingles, and its property of power of remaining for years in wet ground, without decaying, make it invaluable for foundations and for railway ties, fence posts, etc. Good sized spruce and balsam are plentiful and very useful to the farmer for building his house, barns, stables and sheds.

For the necessary buildings of the Railway Company, these woods will also be of great use. The poplar soon covers the country when the hardwood has been cut, and grows very quickly, this as well as the soft maple, is largely used in making pulp for the paper maker. It is also of use in the manufacture of furniture.

From what has been said it will be seen that all the woods required for ordinary use are plentiful, and will prove a great saving of expense in the construction of the Railroad, growing generally where they will be used, they will also save great time and trouble. The future settler will scarcely miss the timber removed from his land, and it will rather be an advantage to him to have his land partly cleared, and the necessary roads made to draw the timber out of the bush.

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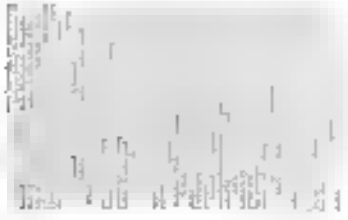

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